GAS JOURNAL

LIGHT . HEAT . POWER . BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. 204. 85th Year. LONDON, NOVEMBER 8, 1933. No. 3677. Price 1s.

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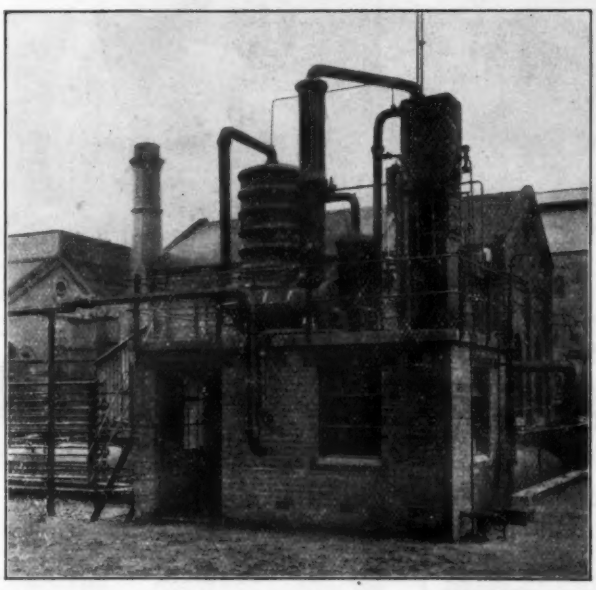
SIMON-CARVES BENZOLE PLANTS



Simon-Carves Benzole Plant at North Shields for the Newcastle-upon-Tyne and Gateshead Gas Co., recovering 275 gallons per day of 90% Benzole at 120° C.

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FIG. 105

FIG. 256

FIG. 257

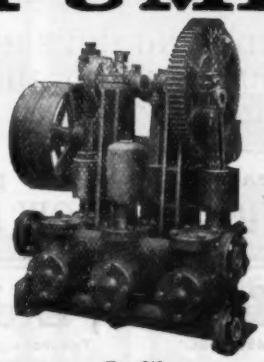


FIG. 943

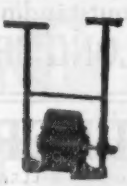


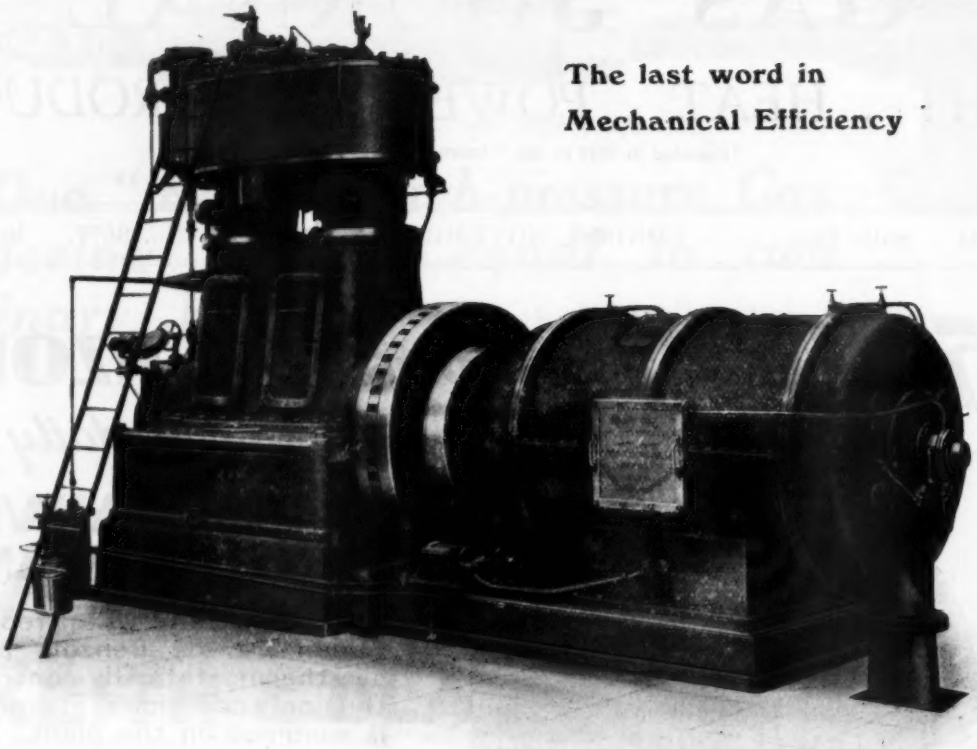
FIG. 187

FIG. 69

FIG. 894

CRANKLESS COMPRESSORS

The last word in Mechanical Efficiency



Steam Driven Michell Crankless Gas Compressor, 350,000 c.ft. per hour, 20 lbs. pressure.

The CRANKLESS COMPRESSOR embodies distinctive features ensuring minimum frictional losses and very high volumetric efficiency.

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LAMPS

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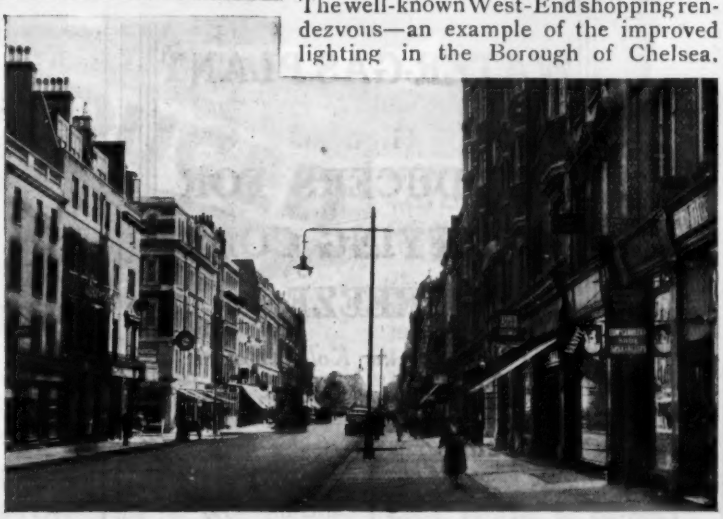
Looking towards the Royal Albert Hall—a part of the great Westminster re-lighting scheme.

The "ROCHESTER" Lamp with Sugg's "K" type Directional Reflector.

The upper picture shows the Upright "Rochester" and the lower the Suspension type, which may be carried in swan-necks on columns, from tramway standards or on central suspension gear—as well as in the manner shown. The "Rochester" with Directional Reflector has been the means of securing many big lighting contracts for GAS.

SLOANE STREET, W.
The well-known West-End shopping rendezvous—an example of the improved lighting in the Borough of Chelsea.



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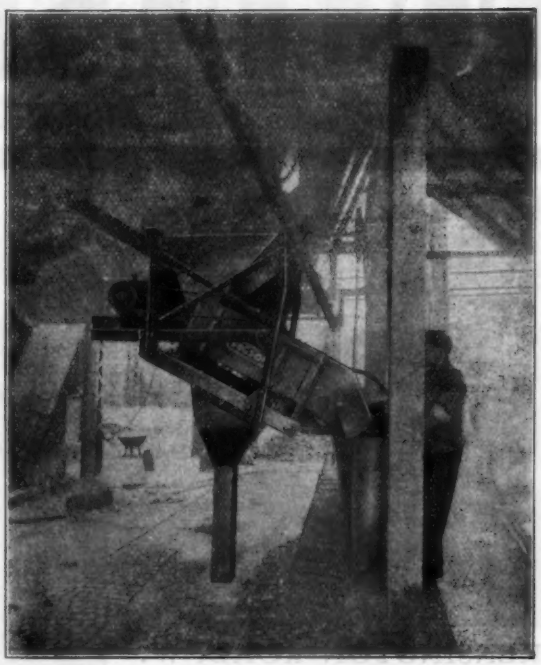

Portable unit consisting of "Live-wire" Debreezing Screen and bagging chute.

OF PROVED EFFICIENCY

The above illustrates only one of five Pegson "Live-wire" Vibrating Screening Units installed at the STRETFORD GASWORKS, MANCHESTER.

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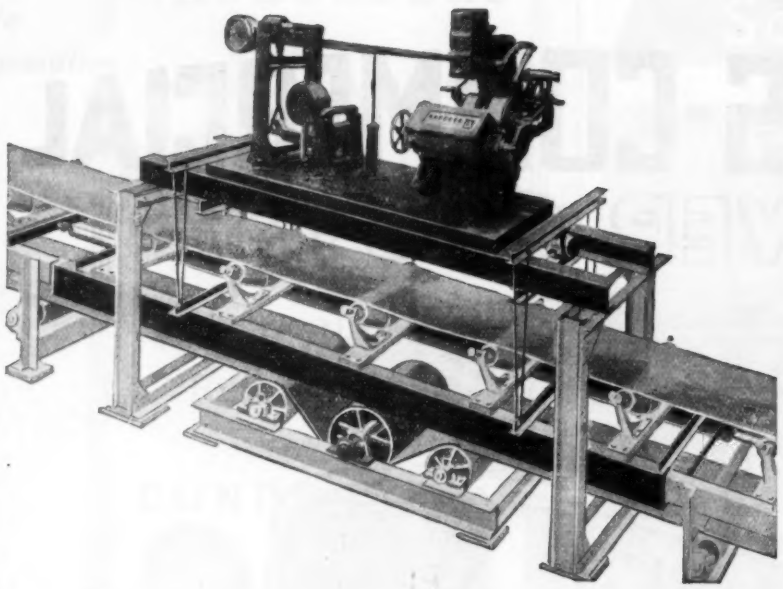
THE "BLAKE-DENISON" AUTOMATIC CONTINUOUS WEIGHER AND RECORDER



will furnish you with accurate weight records of coal or coke carried over Conveyors of the Belt or Bucket type, and thus enable leakages to be detected and stopped.

This machine is at work at many important Gas Works and Coke Ovens throughout Great Britain.

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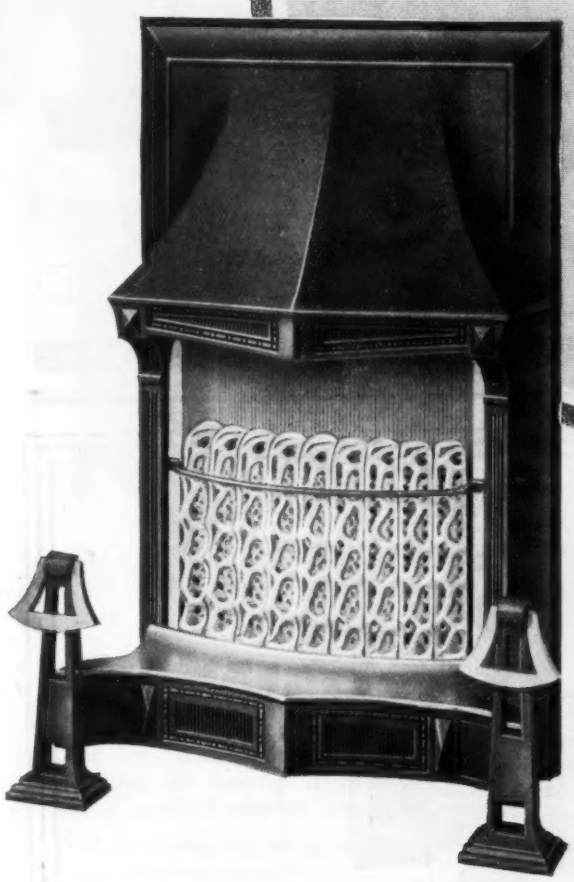
The Fletcher

"ALBANY"

Gas Fire

(with Drop-pattern "dogs")



IN their "Albany" fire Fletcher's have introduced a design of very striking appearance that is at the same time very much "at home" in an extraordinary variety of settings. This interesting series embraces square and round top models, each with and without the handsomely-designed "dogs." The illustration shows the "Albany" with the new drop-pattern "dogs."

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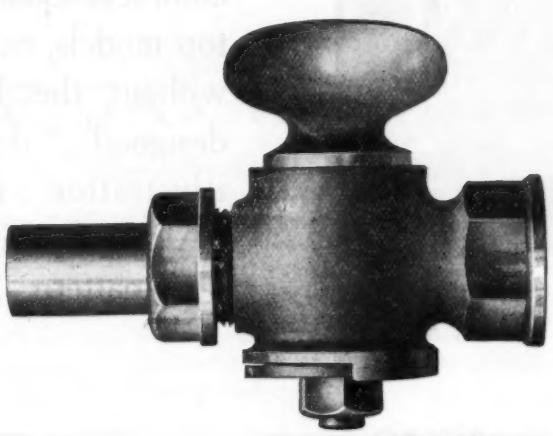

DESIGN No. 50

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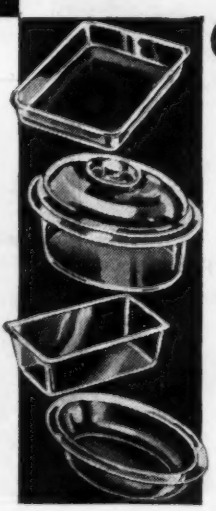

Glass Ovenware

THIS up-to-date Vulcan Cooker is bound to make an instant appeal to your customers. The addition of an ARMOURPLATE GLASS door is a practical improvement, for it enables one to see the food in process of cooking, without opening the oven door and letting cold air rush in. The double glass door, heat-resisting and practically unbreakable, is constructed with an intervening air space, obviating condensation of moisture on the glass and maintaining an efficient insulation of the oven heat.

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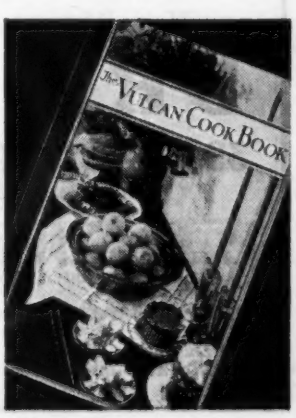
The well-planned hot-plate contains three boiling burners and reversible griller. All taps have patent self-adjusting and centring injectors. The stove is finished inside and outside in "Ceramic" porcelain enamel, and is supplied complete with stand, plate-rack, splasher-plate, and chromium-plated towel rail.

And, as appropriate equipment for this modern glass-panelled Cooker, a set of four pieces of Orlak Fireproof Glass Ovenware is included.

VULCAN STOVES



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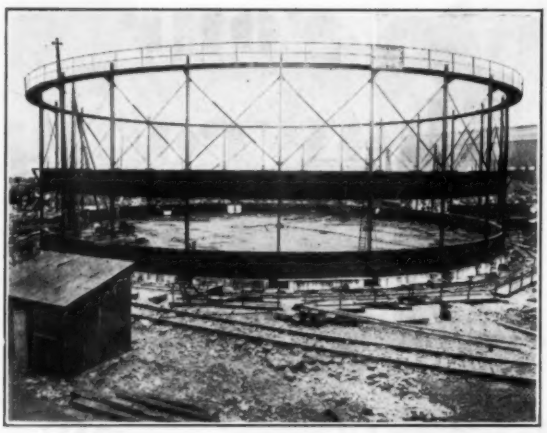

VIEW SHOWING BOTTOM PLATING AND COMMENCEMENT OF ERECTION OF SIDES OF SHELL PLATES.

VIEW SHOWING ERECTION OF FRAMING FOR FLOATING DISC.

PHOTOGRAPHS SHOWING PROGRESS OF ERECTION OF KLONNE DRY GASHOLDER TWO MILLION CUBIC FEET CAPACITY AT THE PORT TALBOT WORKS OF THE BRITISH (GUEST, KEEN, BALDWIN) IRON & STEEL COMPANY

CONTRACTORS—THE HORSELEY BRIDGE & ENGINEERING COMPANY, LTD.

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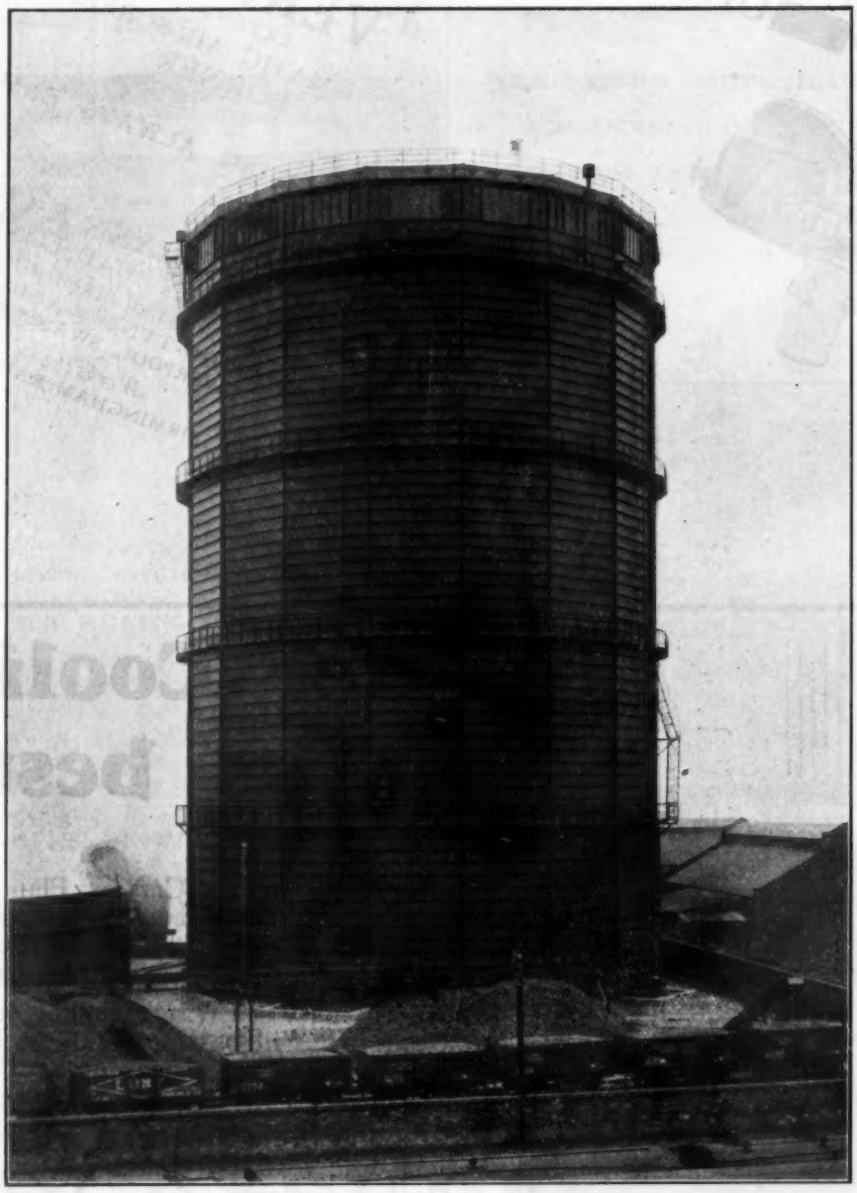

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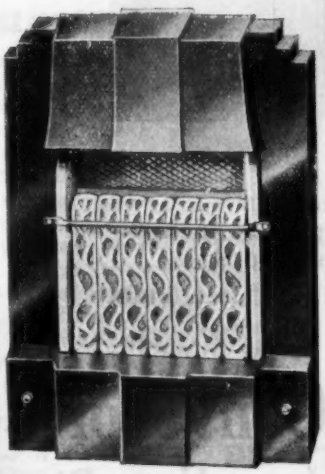

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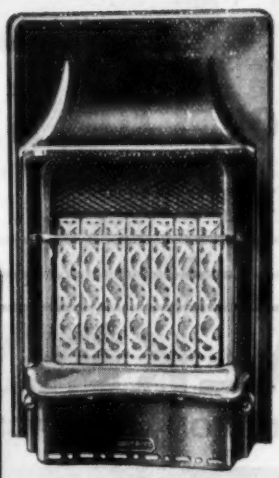

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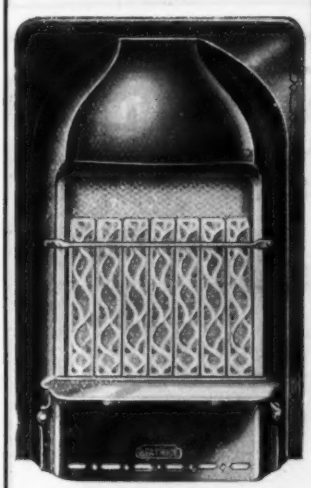

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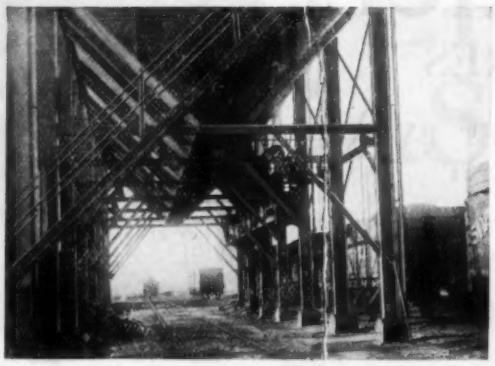
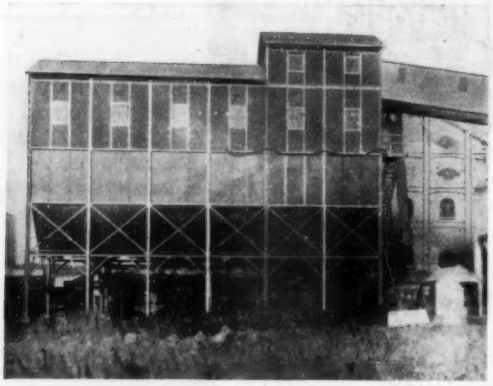


All plants designed to include modern up-to-date units.



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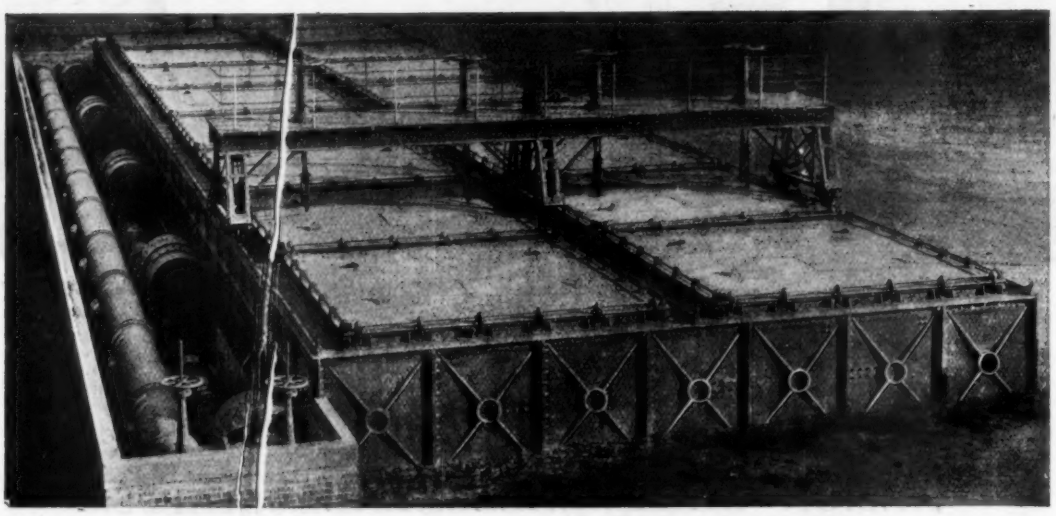

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ON GROUND OR OVERHEAD
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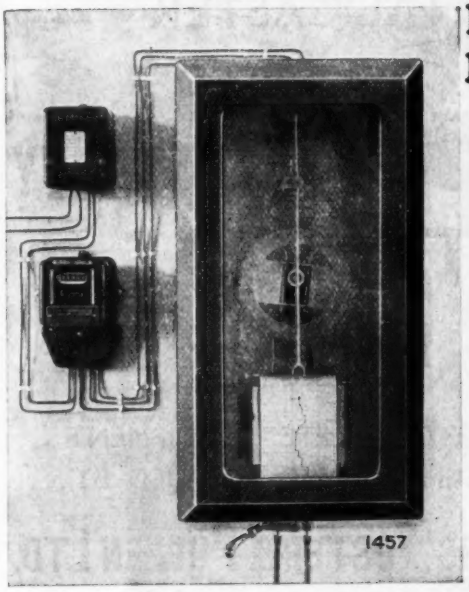

Low pressure recorder with electric transmission. Note direct operation of pen from balance tube.

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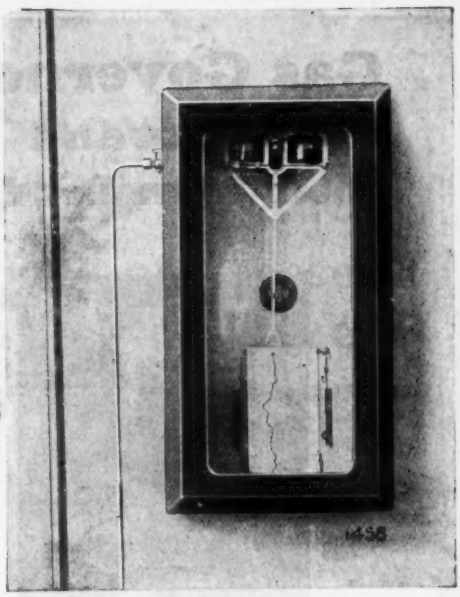
Instruments are supplied for recording low pressure vacuum density, volume, heat value and specific gravity. Suitable compound instruments facilitating comparison of records are available. The simplicity of the ring balance principle ensures permanent sensitivity and reliability.

Particulars on request.



Density Recorder. All instruments have strip chart with collecting spool or pendant through slot in case.

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specially designed to exclude coke dust and other deleterious substances. Direct or alternating current. Also switch and control gear.

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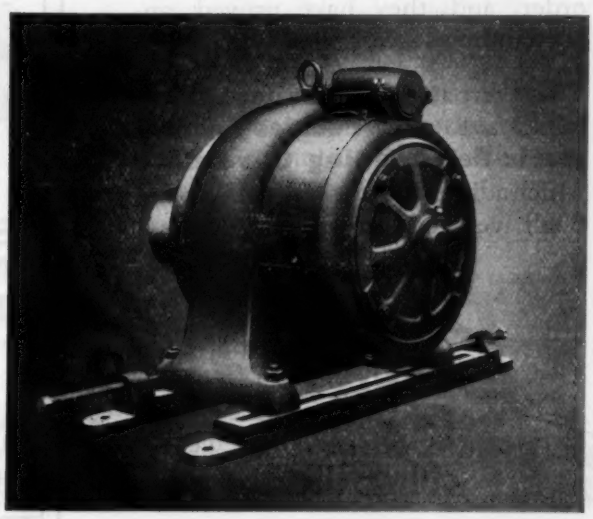

Gas Governors that attend to their own Loading

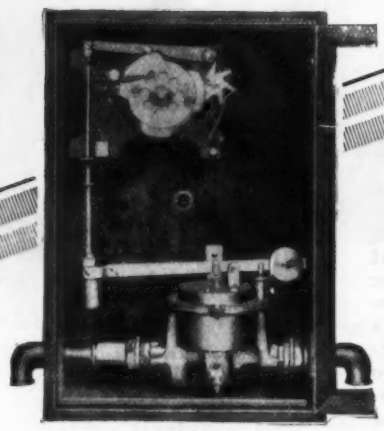

FIG. 49
CLOCK FOR AUTOMATIC TIME LOADING

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This is what is happening in plants using **Peebles' Patented System of Clock Loading.** Automatically the pressure in the mains affected conforms to a definite daily chart and, if required, a special chart for Sundays. The essential apparatus is small, highly efficient, and thoroughly reliable.

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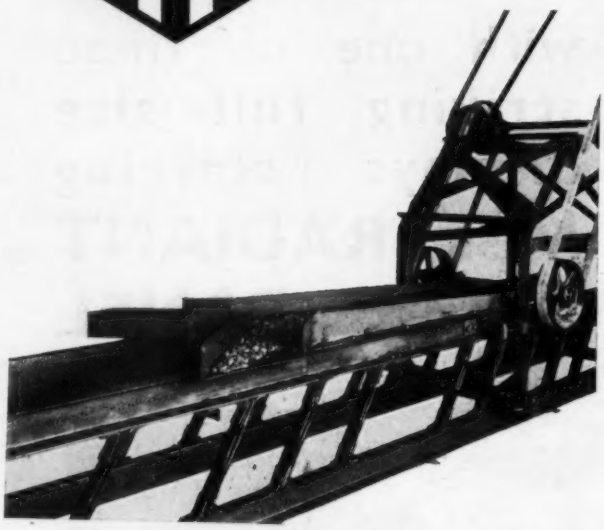

"H.H." Coke Screen at Wolverhampton Gas Works.

THE ONLY LOGICAL WAY IN WHICH TO SCREEN COKE IS TO SEPARATE THE LARGER SIZES FIRST AND TO ELIMINATE THE BREEZE LAST OF ALL. This is the method we adopt in the "H.H." Coke Screen, which is characterised by very high screening efficiency, over 95% being obtained in actual practice. The power consumption of this screen is much lower than that required for rotary screens, while the machine acts also as a conveyor, thus facilitating distribution of the graded products into bunkers. ***The only moving part is the shaft carrying the two unbalanced pulleys which actuate the screen,*** there being no cams, rockers, or other complicated parts to get out of order. These screens are built in lengths up to 25 ft., two or more screens being arranged in series where greater lengths are to be covered. Each screen is designed to suit the particular number of grades and the distribution required.

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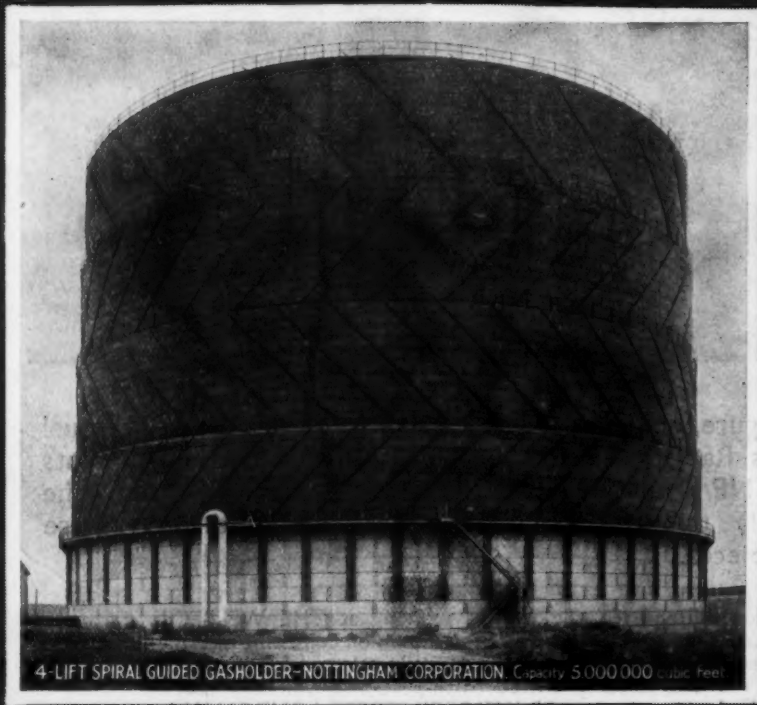

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Every wheel of the attachments is shewn in these photographs — they are photographs and not drawings with some of the wheels missed for the sake of effect—every wheel is there. Count up the number of wheels you can see — you'll be surprised how few there are.

GEORGE WILSON GAS METERS LIMITED

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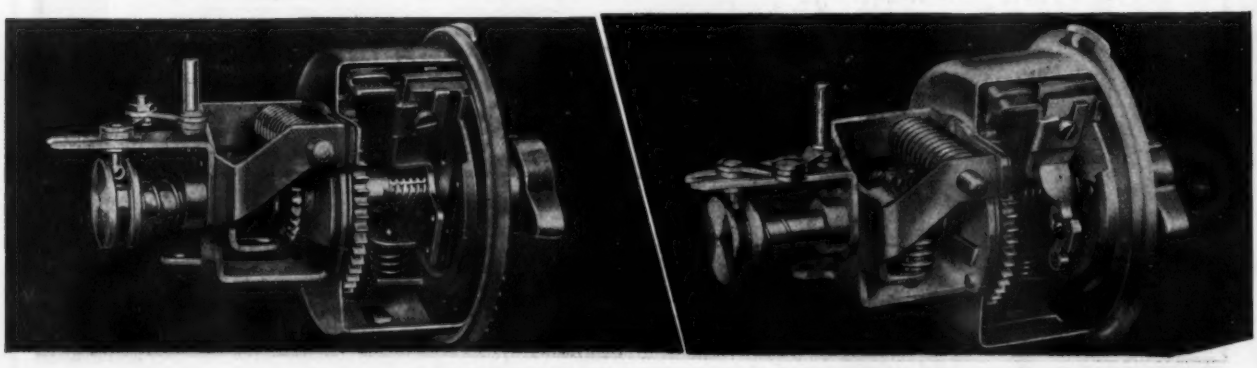

Richmonds "Newlyn" Thermal Storage Gas Water Heaters are made in two models as here illustrated. These designs provide an alternative choice to comply with personal taste and suitability for the space chosen for fixing. Both Models embody the same technical and domestic advantages and both have a storage capacity of 2¼ galls.

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Low Capital Charges;
Saving in Cost of Coal-Gas;
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Decreased Prices for Gas-Coal;
Independence of Labour;
Independence of Gas-Coal;
Less Naphthalene Troubles;
Higher Flame Temperatures;
Improved Combustion;
Purer Combustion Products—

leading to

Amazing Saving in "Peak-Load" Service
for both
Quantity and Quality
and resulting in

Cheaper and Better Town-Gas

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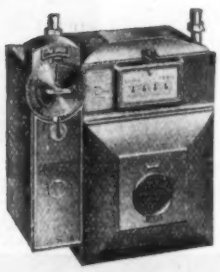

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THE GAS JOURNAL

NOVEMBER 8, 1933

Vol. 204. 85th Year No. 3677

A Glance at the Contents—

The Institution at Philadelphia.

Continuing his story of the Institution of Gas Engineers' tour to Canada and the U.S.A., the Editor describes the visit to Philadelphia. [p. 395.]

Continuous Billing at Portsmouth.

In a paper before the A.G.A. Convention at Chicago, Mr. Thos. Carmichael, of Portsmouth, described the methods adopted by his Company in regard to meter reading and collecting of accounts. [p. 404.]

Advances in Metal Surgery.

Mr. C. W. Brett, M.I.W.E. (Managing Director of Barimar, Ltd.), gives some interesting details of scientific welding, and shows that welding, at least in repair work, has become a certain means for uniting every known alloy. [p. 410.]

Watson House: An English Research Centre.

In a paper before the Annual Convention of the American Gas Association at Chicago Mr. C. A. Masterman, of the Gas Light and Coke Company, outlines research and training practice carried on at Watson House as typical of the research centres of the British Gas Industry. [p. 407.]

Wales and Monmouthshire Junior Association.

The opening meeting of the 1933-34 session was held at the Royal Hotel, Cardiff, on Oct. 21, when Mr. H. S. Bartlett, the new President, delivered his Presidential Address. [p. 412.]

Coke for the London Market.

The preparation of coke for the London market was the subject of a paper read before the A.G.A. Convention at Chicago by Mr. F. M. Birks, Mechanical Engineer to the Gas Light and Coke Company. [p. 399.]

London and Southern Junior Association.

The opening meeting of the London and Southern District Junior Gas Association was held at the Westminster Technical Institute on Oct. 20, when Mr. H. C. Sims delivered his Presidential Address. [p. 413.]

Gas Production in Amsterdam.

The General Director of the Municipal Gas Undertaking of Amsterdam states that as a result of the general industrial depression the gas production for 1932 amounted to 4062 million c.ft. compared with 4155 millions in 1931. [p. 403.]

Forthcoming Engagements

Nov. 9.—S.B.G.I.—Meeting of Council at 11 a.m.

Nov. 9.—S.B.G.I.—Autumn General Meeting, Hotel Metropole, London.

Nov. 11.—MANCHESTER AND DISTRICT JUNIOR ASSOCIATION.—Visit to Oldham. Paper by Mr. H. Partington.

Nov. 14.—I.G.E.—Session at the Public Works, Roads, and Transport Congress and Exhibition, Royal Agricultural Hall, 11 a.m.; Joint Session of the Institution and the Association of Public Lighting Engineers, 3 p.m.

Nov. 14.—I.G.E.—Meeting of Gas Education Committee, 5 p.m., 28, Grosvenor Gardens, S.W. 1.

Nov. 14.—NATIONAL GAS COUNCIL.—Meeting of Central Executive Board at 2.30 p.m.

Nov. 15.—SOUTHERN ASSOCIATION.—General Meeting, Hotel Metropole, London, at 2.15 p.m.

Nov. 18.—WALES AND MONMOUTHSHIRE JUNIOR ASSOCIATION.—Visit to Porthcawl. Paper by Mr. Darrel Rees.

Nov. 22.—B.C.G.A.—Meetings of the Executive Committee, 12 noon; General Committee, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Nov. 23.—SOUTHERN ASSOCIATION (EASTERN DISTRICT).—Meeting at 28, Grosvenor Gardens, S.W. 1, 2.30 p.m. Discussion on "General Installation Charges."

Nov. 23.—SOUTHERN ASSOCIATION (WESTERN DISTRICT).—Commercial Meeting, Rougemont Hotel, Exeter, 2.30 p.m.

Nov. 25.—NORTH OF ENGLAND AUXILIARY ASSOCIATION.—Half-yearly Meeting at Newcastle. Paper by Dr. G. P. Lishman, F.I.C.

Nov. 25.—WESTERN JUNIOR ASSOCIATION.—Meeting at Bath. Inspection of Messrs. Stothert & Pitt's Pump Department. Paper by Mr. G. K. Rose.

Nov. 29.—I.G.E.—Meeting of Meters Committee, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Dec. 1.—WESTERN JUNIOR ASSOCIATION.—Meeting at Bath. Address by Mr. F. P. Tarratt.

Dec. 2.—SCOTTISH EASTERN JUNIOR ASSOCIATION.—Visit to R. & A. Main, Ltd., Falkirk. Paper or Cinema Display.

Dec. 6.—MANCHESTER AND DISTRICT JUNIOR ASSOCIATION.—Visit to Thomas Glover & Co., Ltd., Manchester. Lecture on the "Manufacture of Meters."

Dec. 7.—MIDLAND JUNIOR ASSOCIATION.—Meeting. Paper by Mr. G. H. Davies.

Dec. 8.—LONDON AND SOUTHERN JUNIOR ASSOCIATION.—Meeting. Paper by Mr. H. J. Risby.

Dec. 9.—SCOTTISH WESTERN JUNIOR ASSOCIATION.—Meeting. Paper by Mr. A. Bujnowski.

Dec. 11.—I.G.E.—Meetings of Finance Sub-Committee, 2 p.m.; Membership Sub-Committee, 2 p.m.; General Purposes Committee, 3 p.m.; Benevolent Fund Committee of Management, 4.30 p.m., 28, Grosvenor Gardens, S.W. 1.

Dec. 12.—I.G.E.—Meetings of Council, 10 a.m.; Gas Education Executive Committee, 4 p.m., 28, Grosvenor Gardens, S.W. 1.

Dec. 16.—WALES AND MONMOUTHSHIRE JUNIOR ASSOCIATION.—Meeting at Cardiff. Paper on "Modern Methods of Manufacturing Malleable Iron Pipe Fittings," by Mr. C. E. Green.

Dec. 21.—I.G.E.—Meeting of Refractory Materials Joint Sub-Committee, 2.30 p.m., 28, Grosvenor Gardens, S.W. 1.

1933 "JOURNAL" Directory.

Page 26. FLEETWOOD. W. P. Smith appointed E. & M. vice H. N. Dann.

EDITORIAL NOTES

Improving Conditions

EVIDENCE is accumulating of improving conditions in many branches of industry, and one feels justified in anticipating that " one good thing will lead to another." The Trade Forecast of the Federation of British Industries for the fourth quarter of this year declares that it is possible to view the future with optimism—the world having planted its feet so firmly on the road to recovery that it will take " something more drastic than such transitory events as the instability of the French franc or the American dollar to divert it from its course. Even should there be some modification of the French gold standard or a further appreciable flight from the dollar, there is no reason why we should not be able to retain control of our domestic situation. The same is true of many other countries."

At the end of September, the number of insured persons here in employment was 9,943,000, which represented an increase of 151,000 during the quarter. October maintained this gratifying trend, there being a further reduction during the month in the registered unemployed of 38,000, and a reduction of 448,000 in comparison with the figure a year ago, when the industrial improvement became apparent. Since January, when the mid-winter figures were recorded, the unemployment figure has fallen by 600,000.

Turning to the *Westminster Bank Review* for October, we are further encouraged. It is pointed out there that: " One striking change is apparent in the situation between the autumns of 1932 and of 1933. A year ago, although we in Britain were feeling enheartened by the success of the greatest debt conversion operation in history, the world as a whole was still bowed down by a depression which all men's efforts seemed impotent to relieve. To-day, while we realize fully that important and difficult problems remain to be solved, the attitude of fatalistic pessimism has given place to one of energetic determination to overcome these problems." That is the attitude which will bring us again to prosperity.

Linking-Up

WE are glad to find that a Member of Parliament who is also a distinguished Engineer should be appreciative of the legislative handicaps now suffered by the Gas Industry. In his Address as President of the Institution of Mechanical Engineers Mr. Alan E. L. Chorlton envisages the inter-working of gas, electricity, and water services, and believes that the future of the Gas Industry lies in the inter-connection of existing undertakings somewhat upon the lines of the electricity grid. As a matter of fact, inter-connection is taking place, and with economy ever the first consideration. In the earlier days of the Industry, says Mr. Chorlton, installations were relatively isolated, coal was cheap to transport, and as time went on legal restrictions became so encircling and so preventive of outside development that all available talent was concentrated on the plant itself, resulting in this country taking the lead over others in the design and construction of gas production plant for towns. " It is difficult to set out adequately to what extent gas has been handicapped by legislation in this country, but it has been a very real limitation."

The statement of Mr. Chorlton about the efficiency of gas-making plant has an important bearing on his main suggestion, which is long-distance gas supply from coke ovens. The efficiency of gas manufacture in relatively small plant largely influences the question of long-distance transmission, and a limit is quickly reached even in comparatively short lengths of pipeline which would apply to this country when pumping costs become uneconomic. Regional working is undoubtedly the right plan, bringing in its train all the advantages of power to purchase cheaply and facilities to afford the consumer greater service; and this regional working is in process of development in this country. Also, we would ask Mr. Chorlton not to forget that the Gas Industry must be absolutely assured of an adequate supply of gas at all times. Reliability is one of the most cherished possessions of gas supply. More can be done and will be done in linking-up undertakings economically throughout the country; and with amended legislation the Gas Industry will be able to serve the Nation better.

Mr. Chorlton advocates a water grid and a gas grid as well as an electricity grid. As examples of interworking he asks us to consider the following: Electrically driven pumps for the water grid, operating during periods of least demand to obtain the lowest possible rate for current; gas engine driven pumps in the coke oven areas for the water grid; electrically driven pumping for gas on a similar basis; gas engine driven electric generating stations using cheap gas from storage as the supply for peak electrical loads; water storage systems to act through turbines on electricity supply systems. " The proper use of all these forms of energy (for each has supreme advantages in certain applications)," he remarks, " is absolutely essential if an efficient national scheme for all is to be developed. It is one which would be in advance of any already existing in other countries."

Coke Preparation

To meet the ever-increasing demand for coke for domestic hot water boilers and also, to a smaller extent, for the open firegrate, the Gas Light and Coke Company have during recent years paid a great deal of attention to the preparation of coke for the market; and an account of the remarkable strides which have been made in this direction was given by Mr. F. M. Birks at the Annual Convention of the American Gas Association in Chicago. A substantial extract of his paper appears in our issue to-day. Continuous research is undertaken both to ensure that the various classes of fuel made adhere to a rigid standard of quality and to endeavour to produce new methods of manufacture and treatment which will improve the products. Also much experimental work is being done to render domestic and central heating boilers fully automatic in operation. The Company supply a special smokeless fuel—" Cleanglow "—for the open firegrate, prepared by crushing large continuous vertical coke. The large coke is free from shale, and the resulting product has better combustibility than similar sized fuel prepared by grading from run-of-retort house coke. As for the demand for sized coke for domestic boilers, this has now far exceeded the supply obtained by screening, and it has been necessary to resort to crushing.

Naturally the paper by Mr. Birks is largely devoted to the efficient and economical crushing of coke and the elimination of shale: and the author's comments on crusher design, based upon many experiments and wide experience, are of value. He advocates a single roll machine with spring-mounted back-plate; the roll should be mounted to facilitate easy removal, and the teeth on the roll should be as simple in design as possible, to withstand abrasion; and the gear drives should be totally enclosed in an oil bath. Small boilers have a very restricted grate area and are inclined to be rapidly choked by free shale, so that its elimination is essential. The general method of extracting the shale has been to wash the graded coke by water washers. Mr. Birks explains that the result, as far as cleanliness of the product is concerned, is excellent, but the time taken for the coke to dry imposes a difficulty. The system of stocking coke from the screening plant in overhead hoppers from which it is loaded direct into motor lorries does not allow sufficient time for the water to drain from the coke. The

washed coke has therefore to be placed in heaps for a sufficient period—anything from a week to a fortnight—to ensure that it may be delivered free from moisture. This, of course, means considerable additional expense, and last year the Company installed a dry cleaning process at the Southall Works. The wear and tear with this system, states Mr. Birks, will probably be less than with water washing, and the finished product is greatly superior. The Company, who are setting an excellent example in coke preparation for the market, are extending the system to plants at other works.

Research

MUCH as we undoubtedly found to admire on the service side of the gas undertakings visited during our tour in Canada and the United States, it is certain that our friends on the other side were equally appreciative of the description of the activities of Watson House which Mr. C. A. Masterman presented to the Annual Convention of the American Gas Association. Mr. Masterman dealt with Watson House as an example of one of our research centres. It is an excellent example, and, as the author said, representative of a possible direction in which things may develop.

One of the statements in the paper has a special bearing upon what we saw subsequent to the Convention, at the Cleveland Laboratory of the American Gas Association. We refer to where Mr. Masterman says: "At the present time there is visible [in England] a growing tendency towards direct co-operation between the various independent laboratories as a result of which overlapping and unnecessary work are diminished. This may ultimately lead to some official system of test or certification of appliances, but no such system is yet in operation." On the other side of the Atlantic we saw no sign of the abandonment of this system.

Meter Reading and Accounts

ANOTHER paper presented at the Annual Convention of the American Gas Association by a visiting delegate is also reproduced in this issue of the "JOURNAL," and this must have been of value to our friends on the other side by reason of the fact that it describes methods actually employed in connection with meter reading and the collection of accounts by an undertaking which, in point of size, ranks among the first twenty in the United Kingdom. Considerably more than 50% of the consumers of the Portsmouth Gas Company receive their supplies of gas through prepayment meters. This is a position which is fairly general in our country, because for years past the total number of prepayment consumers in Great Britain has largely exceeded the total number of ordinary consumers, and the preponderance of those who pay in advance for their supply is shown to be increasing as each official return is issued. During our tour in the United States we visited places where the prepayment meter is unimportant.

This fact is, perhaps, not entirely unconnected with another—namely, that monthly billing seems to be pretty general in Canada and the States, whereas, as Mr. Thomas Carmichael points out in his paper, in the majority of undertakings in the United Kingdom the quarterly practice of meter reading still obtains, though it has been realized by several that, from the point of view of general efficiency and more even distribution of work throughout the year, the adoption of some other method would be more advantageous. After carefully considering the relative merits of continuous meter reading—*i.e.*, the reading of a proportion of the meters daily over a period of three months by a permanent staff of meter readers—and of monthly meter reading, it was decided to adopt the former system, the latter not being favoured owing to the extra expense involved. This, Mr. Carmichael points out, is apparent when it is explained that, in Portsmouth, the average consumption for ordinary credit consumers amounts to 48,000 c.ft. per annum, which means that the cash to be collected per consumer per month would have amounted only to approximately 10s.

Metal Surgery

GREAT advances have been made quite recently in the science of welding; and readers will find much of interest in an excellent article on "Metal Surgery" by Mr. C. W. Brett on later pages. Welding as a means of repair has lost its experimental character and has become a certain means for uniting every known alloy; and the author maintains that a valuable casting need never be regarded as beyond repair. He describes the discovery of a process for repairing cast-iron and malleable parts at temperatures no higher than those commonly employed in brazing—a process which has been commercially feasible for only about three months. It involves an entirely new technique in manipulation and the use of welding materials of a special type; and with its aid even large castings can be welded without pre-heating and with no risk of distortional troubles. The process, it is stated, allows all light castings to be repaired at rarely more than a sixth of the cost of a replacement part. Of course, for heavier sections high temperatures have still to be used for obtaining effective welds, but they have been rendered safe by scientific means for obviating distortion.

Certainly repair work of the kind discussed in the article is adaptable to the requirements of gas engineers. Pump castings, steam engine parts, booster components, condenser fittings, conveyor components, and so forth can be speedily repaired; and this, says Mr. Brett, at a cost which is always much less than that of buying new castings. If the defect to be corrected is due to overloading or a weakness in design, any necessary reinforcing can be carried out to ensure that there will be no recurrence of the trouble. A feature of the article which will appeal to gas engineers is the author's reference to the availability of mobile welding units which can visit a site on which repairs to machinery are needed and carry them out on the spot. Mr. Brett ends his account thus: "The only warning note that needs to be sounded in connection with welded repairs is that they are not nearly so simple as they appear. In consequence they should be entrusted only to concerns which have a very wide experience and which are equipped with the most up-to-date laboratory and workshop facilities. It may be taken as a safe rule that unless a guarantee is given before work is begun there is something lacking in a repairer's organization."

Empty Haulage of Railway Wagons

IT is understood that a settlement has now been concluded between the Railway Companies and various Associations representative of the trading community regarding the interpretation of Paragraph 7 to the Fifth Schedule of the Railways Act, 1921. As the matter is of particular interest to those gas undertakings which operate, or contemplate employing, privately-owned railway wagons, it will be helpful to bring the facts to the notice of our readers.

The provision of the Act of 1921 to which allusion is made above has since been modified, with statutory effect in favour of the trader, and enacts that no charge is to be made in respect of the haulage of empty trucks in the following circumstances:

(*a*) Where returned to original forwarding station.
(*b*) Where forwarded to a station or siding for the purpose of being loaded for transit for return to the starting point.
(*c*) Generally, that free haulage will be given for a continuous journey, subject to interruptions for repairs, &c., on specified conditions, not exceeding the distance forwarded when loaded.

It will be appreciated that these provisions do not meet all the circumstances likely to arise—*e.g.*, the transfer of a wagon from one owner to another, or the despatch of a truck from the owner to a trader on hire. The Railway Companies took the view that they were entitled to charge in respect of the transit of wagons in these circumstances; and when the case was brought

before the Railway Rates Tribunal in accordance with section 28 of the Act, no decision was given, as it was suggested that—as an alternative to the certainty that a definite ruling would handicap both sides, and be against the best interests of trade—an agreement should be arrived at between the two opposing parties.

As a result, it has been decided to substitute for empty haulage charges a commuted annual charge—comparable to siding-rents—sufficient to produce to the Railway Companies an annual revenue of £21,000. On the basis of 526,000 privately-owned wagons, at annual sums varying from 1d. in the case of public utility and other wagons to 1s. 10d. each for mineral and tank wagons let on simple hire, it is estimated that this sum will be secured to the Railway Companies. The charges will be paid by the owner (whether the wagon is on hire or purchased outright), except where the truck is under repair contracts, when the commuted charge of 11d. per wagon will be payable by the Wagon Repairing Company.

It is anticipated that the settlement now announced will be put into operation at an early date, although it is not yet known whether it will have retrospective effect. This willingness of the Railway Companies to compose difficulties which are certain to arise when dealing with groups of traders having such varied interests is a helpful sign for the industry of the country.

CORRESPONDENCE

The Cooke-Holton Tar Process.

SIR,—I have read with interest your valuable comments on the paper I presented before the Manchester District Association of Gas Engineers on Oct. 27, 1933, on "The treatment and partial distillation of tar by hot crude gases."

I note that Mr. C. S. Shapley has forwarded a written contribution to the discussion, and since this was not presented at the meeting I should like to have the opportunity of replying to his criticisms.

All tar distillers will agree that by suitable "processing" any of the accepted specifications for road tar can be met. Mr. Shapley states that some large buyers specify a road tar containing tar acids of less than 2%. The process is ideal for obtaining a reduction in the tar acid content, and by "cutting back" no difficulty would be experienced in complying with the specification cited. The "cutting back" method is preferred by many distillers and is one with which Mr. Shapley will be familiar. With regard to the comments on the quality of the pitch produced, I should like to call attention to the helpful contribution of Col. Carr to the discussion, particularly where he states that "It was significant in regard to the process that, after all, up to the production of road tar and increasing the viscosity of the tar, the process was new. After that, of course, if one was going to work to products one had to follow the process of ordinary tar distillers."

It will be appreciated that the main subject of the paper was the preparation of road tars. The Hird stills were put into operation to obtain further working data, and not for the production of products of any particular specification. I am well aware of the specifications of the trade for pitch for export and general purposes, and I can assure Mr. Shapley that there is no difficulty in meeting such specifications by the process described in the paper.

With regard to the necessity for blending the tar, I should like to add that any modern vertical installation is capable of dealing with at least twice its normal production of tar, so that, should blending be proved necessary, then the process would be worked accordingly.

Yours, &c.,
ALFRED L. HOLTON,
Chief Engineer.

Manchester Corporation Gas Department,
Nov. 3, 1933.

A Women's Gas Association.

SIR,—The question of a Gas Association for Women was brought forcibly to my notice by Mr. D. Pratt's paper before the Wales and Monmouthshire Association of Gas Engineers and Managers, published in the "GAS JOURNAL" for Sept. 27. Mr. Pratt asks: "What is wrong with the Gas Industry?" A Gas Association for Women is badly needed. I think the women in the home and in industry (the workers) need to get together to exchange views and ideas with each other. A woman will not talk freely to a man; she is afraid of being laughed at!

At the beginning of this year I put forward the suggestion to several people that an Association for Women in the Gas Industry was most desirable. It was hailed as a very useful idea, and thanks to the Editress of "A Woman's Viewpoint" in the "GAS SALESMAN." The suggestion is not new now. The women actually in the Industry suffer, I think, from a sense of repression, because they are rather in the minority. I would like to change that feeling; and if we are to do any good we must be banded together. The social side will, I think, automatically come into the business, but not too much. We want the professional women, the journalists, saleswomen, and demonstrators of gas undertakings and manufacturers. We must be a useful organization so as to make our weight felt in the Gas Industry.

Will as many as possible join me and send me their names and addresses as soon as possible?

Yours, &c.,
HELEN CRAWFORD-FOX, M.C.A.
(Parkinson Stove Company, Ltd., Stechford).

22, Redthorn Grove,
Stechford, Birmingham,
Nov. 3, 1933.

Gas Manufacturing Plant for a Small Works.

SIR,—I have read with interest the Presidential Address of Mr. W. Scott, of Tillicoultry, under the above title, published in the "JOURNAL" of Oct. 18.

I have no criticism to offer on Mr. Scott's ideas and conclusions, but I do not think he could have been fully aware of the significance of some of the figures on which he based his costs. I refer more particularly to the price of coke. Mr. Scott argues that as long as he only produces 5 cwt. of coke per ton of coal, he can sell at an average of 20s. per ton, but for all other figures of production the average receipts will be only 16s. As a matter of fact, Mr. Scott appears to have taken 16s. 6d. as an average for the method of gas-making which produces 6½ cwt. Even with this slight modification, however, the figures adopted lead to some curious anomalies, as the following examples will show:

1.	6½ cwt. at 16s. 6d.	=	107½ units
	5 cwt. could have been sold at 20s.	=	100 ,,
	Leaving		7½ ,,
	for the additional 1½ cwt., which is at the rate of		4s. 10d. per ton
2.	7½ cwt. at 16s.	=	120 units
	5 cwt. could have been sold at 20s.	=	100 ,,
			20 ,,
	therefore the balance of 2½ cwt. only fetches		8s. per ton
3.	8½ cwt. at 16s.	=	136 units
	5 cwt. at 20s.	=	100 ,,
			36 ,,
	therefore the balance of 3½ cwt. fetches		10s. 3d. per ton

Examining these instances, we get the curiosity that the more coke we make over and above 5 cwt., the bigger price we get for it after satisfying the basic demand at 20s. per ton. Had we made 1½ cwt. over and above the standard 5 cwt. we should only have received 4s. 10d. per ton for such surplus. If we make another cwt., however, we obtain 12s. 9d. per ton for it, bringing the average of the surplus to 8s. Make yet another cwt., and we get a further 16s. for that, bringing the average of the surplus to 10s. 3d.

In other words, the figures on which the tables are constructed are contrary to the theory laid down in the introduction to the tables—viz., the more coke you produce, the less will be the prospects of selling it, and the lower the price you will be compelled to take.

It is admitted that, even with adjustments, the figures produced do not undergo any substantial variation. It shows, however, that a little care should be adopted when using short-cut methods of estimating the cost of gas such as is put forward in this paper to a Junior Association.

Yours, &c.,
"ENGINEER."

Oct. 31, 1933.

PERSONAL

Reference is made in the Co-Partners' Magazine of the Gas Light and Coke Company to the retirement of Mr. E. J. HUTCHENCE. Mr. Hutchence, who was a member of the Engineering Staff of the Imperial Continental Gas Association and also British Vice-Consul at Hanover, returned to England in 1914 when he joined the Company's Engineering Staff at Beckton, subsequently being in charge of the Bow Common Station and latterly of Stratford.

* * *

With regard to the visit of the Institution of Gas Engineers to Philadelphia, which is fully described on other pages of this issue, it should be said that there was one matter of keen regret to every member of the party. This was that Mr. GEORGE DIXON, B.Eng., Engineer and Manager to the City of Nottingham Gas Department, who was suffering from a recurrence of an old trouble, had to remain behind for surgical treatment. Mr. Dixon, however, was able to follow us home a week or two after we had sailed, and it was a great pleasure to greet him once again, in the Presidential Chair of the Manchester Association on Oct. 27, when he was once more looking perfectly fit.

* * *

Mr. W. P. SMITH, B.Sc., just appointed Engineer and Manager to the Fleetwood Gas Company out of 52 applicants, represents the third generation of gas engineers. His father succeeded his grandfather in charge of the Bolton Gas Undertaking. Mr. Smith is an old boy of Bolton Grammar School, and an Associate of Manchester College of Technology. In 1931 he was awarded a First-Class Diploma of the Institution of Gas Engineers. He commenced his duties at Fleetwood last Monday.

* * *

Mr. H. E. STONE, Engineer and General Manager of the Hong Kong and China Gas Company, Ltd., will be arriving in London *via* the United States of America about the end of November on a business visit.

* * *

Mr. WILLIAM MARSHALL, Gas Manager at Largs, and Mrs. Marshall, have been presented with a number of gifts by the gas-works staff to mark their silver wedding.

* * *

Mr. ARTHUR W. FARQUHAR, Gas Manager at Fraserburgh, was married on Oct. 24 at Echt. From the gas-works staff Mr. Farquhar received a canteen of cutlery.

* * *

On the occasion of his marriage, Mr. WILLIAM STEWART, Gas Manager at Linlithgow, was last week presented by the works staff with an eight-day clock.

* * *

Mr. J. E. .STANIER, Assistant Gas Engineer and Manager to the Stockport Gas Department, has been appointed to a similar position with the City of Stoke-on-Trent Gas Department.

OBITUARY

One of the veterans of the Gas Industry, Mr. JOHN COOK, of Boston, has died. He had been ill only a short time before his end. In his earlier years he entered the service of the Boston Gas Company. Thence he went to Louth, a nearby town, and was appointed Manager of the local gas-works. He filled that position for 25 years, during which time he was also made Consulting Engineer to the Mablethorpe Gas Company. Subsequently he moved to Mablethorpe and took over the Managership of the gas-works there. This post he held until his retirement several years ago.

THE NEWS OF THE WEEK

Exhibitions of Modern Gas Appliances and demonstrations of practical gas cookery are being staged in the Corn Exchange by the Bathgate Gas Company from November 6-11.

A New Concern has lately been organized at Villeneuve (Vaud), Switzerland, with the title La Société d'Etudes et d'Exploitation d'Usines à Gaz, with the object of drawing-up plans for the erection of gas-works and their subsequent exploitation.

A Tribute to Dunbar Gas-Works.—Speaking at a recent Dunbar ratepayers' meeting, Councillor Campbell pointed out that to-day Dunbar was in the very satisfactory position of being able to produce gas at the pre-war rate of 3s. 9d. per 1000 c.ft., which was indicative of the fine management of this concern.

The Evening Star Lodge, No. 1719, whose present Worshipful Master is W.Bro. W. H. Warren, was honoured by a visit from H.R.H. The Prince of Wales, Provincial Grand Master of Surrey, during dinner at the Connaught Rooms following their Meeting at Freemasons' Hall, Great Queen Street, on Wednesday, Oct. 25.

Road Congress, 1933.—By arrangement with the County Councils Association, a conference will be held under the auspices of the Society of Chemical Industry on "The Mechanical Testing of Bituminous Road Materials," on Tuesday, Nov. 14, at the Agricultural Hall. One of the papers to be presented is by Mr. W. G. Adam (Superintendent of the Tar and Ammonia Products Works of the Gas Light and Coke Company, Beckton) and Mr. D. G. Murdoch. It is unfortunate that the date and time clash with the congress arranged by the Institution of Gas Engineers, but perhaps some of our readers may wish to arrange for a representative to attend.

An Official Return shows that the share capital employed by companies in the Gas Industry in Northern Ireland at the end of 1932 was: Nominal capital, £89,800; subscribed capital, £75,372; paid up, £56,598; capital considered as paid, £18,750. The corresponding figures at the end of the previous year were the same in each classification.

The Report of the Gas Examiner for the past quarter shows that the calorific value of gas supplied throughout the area of the city of Edinburgh and its suburbs was 475·3 B.Th.U. per c.ft. It was free from impurity, and the pressure tests throughout the area were also satisfactory. According to the Gas Regulation Act, the quality of the gas supplied must be 475 B.Th.U.

Housing and Health Exhibition.—One of the most interesting exhibits at the Housing and Health Exhibition held in the Kelvin Hall, Glasgow, from Oct. 4 to 28, was the stand of the Glasgow Corporation Gas Department. A feature of the show was a large range of gas fires, beautifully finished in colours to suit any scheme of decoration. The public evinced great interest in these modern products, and as a result of the exhibition business in these gas fires has been exceedingly good.

The Cookery Demonstrations by the Wellington (Salop) Gas Company were brought to a close last week, when at the conclusion of the last lecture the demonstrator (Miss Edith Sanderson) said that the cakes and bread submitted for competition were of a high standard and greatly in advance of those submitted at last year's demonstrations. Consequently she had had considerable difficulty in making her awards. There were 80 entries and the attendance during the series of demonstrations was 1238.

THE NEWS—*continued.*

The Athletic and Social Club of the Blackpool Corporation Gas Department have opened new club premises in Rigby Road. Alderman P. J. Tomlinson (Chairman of the Committee) performed the inauguration ceremony. Mr. T. R. Cook, Engineer and Manager, was present, and a silver cigarette box was handed to Alderman Tomlinson from the members as a souvenir.

A Contract Has Been Entered Into, stated Mr. J. D. Smith, Engineer and Manager of the Belfast Gas Department, to the Gas Committee of the Corporation, with the Down County Council for a supply of approximately 1,800,000 gallons of tar for use on the roads. This represents the Council's annual requirements, and is the largest order the Department has ever received from that source, the previous largest being a year ago when the total was 1,600,000 gallons.

"Punch" Almanack, 1934.—Science has from time to time suggested various expedients for dealing with the depressing fogs for which November is justly notorious, but Mr. Punch's Almanack, published early in the month, is still the only really reliable gloom-dispeller. It is always a good plan to start one's Christmas shopping early, and the purchase of a copy of the Almanack is at once the most fitting and the most pleasant prelude to the campaign. It is a present that you will be determined, as soon as you have bought it, not to give away.

A Complimentary Dinner was given to Mr. F. P. Tarratt, M.Inst.C.E., President of the Institution of Gas Engineers, by the Special Purposes Section of the North of England Gas Managers' Association at the Royal Station Hotel, Newcastle-upon-Tyne, on Nov. 3—Mr. Herbert Lees, J.P., of Hepburn, presiding. "Our Guest" was proposed by Mr. C. Dru Drury, of Sunderland, and seconded by Mr. A. C. Hovey, Past-President of the Association. In reply, Mr. Tarratt referred to the proceedings of the Institution Delegation to Canada and the U.S.A.

Up-to-date Lighting and Heating Equipment was shown in the exhibition which the Cannock District Gas Company held at Cannock last week. Mr. S. E. Laxton (Vice-Chairman of the Company), who opened the exhibition, said that it was the first in the district for a period of thirty years; and it gave an opportunity for the townspeople to see the progress that had been made in recent times. An interesting feature was that thirty years ago the Company had 4556 consumers; while at the present day the number was 10,799. In 1912 they had 35 miles of mains, and that figure had now just about been doubled. Sir John Ferguson Bell, of Derby, a Director and former Vice-Chairman of the Brownhills Gas Company, remarked that it spoke well for the Cannock Company's enterprise that the foremost makers of gas equipment were all represented.

Proposed Extensions at Stourbridge.

To Spend £48,000 on Retorts and Gasholder.

There was a diversity of opinion at a meeting of the Stourbridge Town Council recently in connection with proposals to spend a total of £48,000 in providing a new gasholder in place of one which had been in use for 56 years, and also on the extension of the vertical retort plant which was erected over ten years ago.

There are three gasholders at the works and it was pointed out in a Gas Committee report that there had been no extensions in the last 40 years, although the gas made annually was nearly four times as great as it was when the Undertaking was purchased. It was now contemplated demolishing one of the holders and replacing it with another capable of containing 1½ million c.ft., the estimated cost of which was £24,000.

The retort plant extension would cost a similar amount, and it was mentioned that each year it needed the expenditure of an increasing sum of money in order to keep it in repair.

Councillor H. S. Walker expressed the opinion that many ratepayers would like a statement to be made upon the subject. Was it wise, he said, to spend such a large amount of money in increasing the rateable value of another county? It had to be remembered that their gasworks were situated in Amblecote, which was in Staffordshire, and he was anxious to know whether it was possible for them to procure the nucleus of another gas-works in their own county of Worcestershire. He was not disposed to support Stourbridge money going into the coffers of Staffordshire.

Alderman Fiddian, Chairman of the Gas Committee, said he thought it was impossible to contemplate the building of new gas-works away from their present situation, and it might be that within a few years Amblecote would be part of their borough. The Committee were unanimous that this money would be wisely spent, and he was afraid they would not approve of a new works, which would be uneconomical.

The Mayor (Alderman H. E. Palfrey) observed that if they wished to start a new gas-works in Worcestershire they would have to promote a special Bill in Parliament, and he asked them not to lose sight of the fact that the gasholder would be a replacement. Consequently it would not add anything to the rateable value.

The discussion then ended with the approval of the recommendations.

Gas and Hull Civic Week.

In connection with the Hull Civic Week, recently concluded, an Exhibition of Hull Industries was held in the City Hall, which was visited by over 49,000 people. The British Gas Light Company not only staged an attractive display at this Exhibition, but also had an entry in the Carnival Day Decorated Car Procession, that illustrated above being one of the winning cars. We are informed that exceedingly good business was done at the Exhibition, and that the Company are still busily employed in following up the numerous inquiries.

Wakefield Gas-Works Sports Club.

The President of the Club (Mr. C. W. Ward, Engineer and Manager of the Wakefield Gaslight Company) presided over an attendance of about eighty at the Dinner of the Wakefield Gas-Works Sports Club at the Bull Hotel. He was supported by Mr. G. A. Moorhouse, J.P. (Chairman of Directors).

The toast of "The King" having been honoured, the President next proposed "The Club." Mr. Ward alluded to the desolate piece of land that five years ago they had commenced to convert into a sports ground, and congratulated the Club and the various responsible committees on their success. In reviewing the past year's activities, Mr. Ward observed that the cricket team had made history in winning two trophies—the Montagu Burton Cup and the League Championship Cup.

The prizes won during the year were awarded as follows: Bowls—President's Cup, Mr. F. Lodge; Runner-up, Mr. R. B. Wilson; Semi-finalists, Messrs. W. Mills and S. Nicholson. Tennis—Directors' Cup, Mr. J. McLusky; Runner-up, Miss L. Shaw; Semi-finalists, Messrs. L. Nicholls and G. Buckley, Jun. Cricket—Batting, J. D. Glover, 542 runs, average 31·88; Bowling, J. D. Glover, 71 wickets, average 5·18; Fielding, F. Greenwood.

A toast to the "Chairman of Directors" was proposed by Mr. G. W. Charlesworth, who said he remembered the Chairman being elected a Director of the Company some 35 years ago. He congratulated Mr. Moorhouse on his long run, and hoped he would continue much longer. Mr. Charlesworth spoke of the interest the Chairman had taken in the Sports Club.

Mr. Moorhouse, in responding, thanked Mr. Charlesworth

THE NEWS—continued.

and the members of the Club generally for their kind sentiments, and spoke of the enjoyment he had always derived from his services to the Wakefield Gaslight Company, and of his pleasure at being among them that evening.

Stroud Gas Company's Centenary Exhibition.

In commemoration of a century of service the Stroud Gas Light and Coke Company staged an exhibition in the local Subscription Rooms—an event which proved to more than 12,000 visitors a revelation of the great advances made by

Stroud Subscription Rooms Floodlighted by Gas.

A Section of the Stroud Gas Company's Display at the Centenary Exhibition.

the Gas Industry in recent years. Lady Marling opened the exhibition and was presented, on behalf of the Company, with an order for cooking apparatus, to the value of £100 for the Stroud General Hospital. Mr. B. Hudson (Chairman of the Company) presided, and was supported by Messrs. E. F. Hooper and E. F. Withey (Directors), W. R. Payne (Secretary), and T. H. Woodcock (Manager).

Mr. Hudson, referring to the growth of the Company, explained that the output of gas had increased from 41 million c.ft. fifty years ago to 193 millions to-day.

The value of the exhibition, which was highly successful, was enhanced by a series of cookery demonstrations given daily by Miss A. A. Andrew, of Messrs. R. & A. Main, Ltd. Throughout the exhibition the Subscription Rooms were floodlighted by gas.

Blackburn Gas Department Bowling Success.

The Blackburn Corporation Gas Department have achieved signal success on the bowling green. They are winners of the Bowling League identified with the Blackburn and District Workshops Sports Association, which includes some of the largest factories in the District. This entitled them to hold the silver cup presented by Mr. Raymond Duckworth.

In the Inter-departmental Competition in connection with the gas workers' Social Club, the winner of the Cup presented by Councillor E. Hamer, J.P. (a former Chairman), was Mr. W. McGarry, with Mr. G. Walker as runner up, and Messrs. R. Holden and P. Gannon as semi-finalists. Our photograph shows:—Back row: Messrs. H. Holden, G. Beardwood (Secretary and Treasurer), and P. Gannon; in

Blackburn Gas-Works Inter-Departmental Bowling Competition.

front: Messrs. G. Walker, G. D. Ashworth (Engineer and Manager), Councillor J. Holden (Chairman of the Gas Committee), G. Ogden (Chairman of the Social Club), and W. McGarry (the Cup Winner).

Demonstration of Modern Gas Appliances at West Bromwich.

A series of practical gas cookery demonstrations has been held at the gas showrooms, West Bromwich, in connection with an exhibition of modern gas appliances, which attracted a great deal of public interest.

There was a large attendance at the opening ceremony, over which Alderman J. E. Cox presided. The exhibition was opened by the Mayoress (Mrs. C. B. Adams), and among others present were the Mayor (Councillor Adams), Mrs. Cox, Alderman A. G. Turley, Councillor S. Crump, Councillor S. Shaw, Mr. J. Hunter Rioch, M.Inst.Gas E. (Gas Engineer and Manager), and Mrs. Rioch.

Alderman Cox, having welcomed the Mayoress, said this was the first cookery exhibition to be held in that building. They had been thinking about it for a long time, and now they had made a start he hoped there would be many such exhibitions in the future. Moreover, as soon as they could arrange it they would have lectures in that room, to give information to the housewives of the town on the best use of modern cooking stoves, gas fires, and other gas appliances.

In opening the exhibition, the Mayoress said she had

THE NEWS—continued.

used gas for cooking in her own home for 30 years and had found it most economical and efficient. Every woman, she thought, should have a thorough knowledge of the art of cookery, and she hoped full advantage would be taken of the demonstrations.

The Mayor congratulated their new Engineer, Mr. Rioch, on the exhibition. Gas, he declared, was efficient, clean, and economical when properly used, but, he added, they must understand their stove.

Thanks were accorded to the Mayoress for opening the exhibition, and the cookery demonstrations were given each day by Mrs. M. A. Anthony (Cordon Bleu).

A special feature was a cake baking competition, and during the week a large number of entries were received, for which three prizes were awarded, these being presented by Councillor Mrs. E. A. Smallman, J.P., at the close of the session.

The cookery demonstrations attracted large numbers of people at both afternoon and evening sessions, while two special sessions were arranged for the senior girls in the local schools. Among those present on one occasion were Miss E. Loveday, H.M. Inspector of Schools, and Miss Mary Sharp, Organizer of Domestic Science for West Bromwich.

One afternoon a complete dinner, consisting of a joint of meat, potatoes, vegetables and sweets, was cooked in one oven at the same time, while on another occasion, before a large audience, the oven of the cooker was chained and padlocked during the whole of the cooking period, when a dinner, consisting of chicken, potatoes, vegetables and apple tart, was cooked perfectly.

"Sale" at Newcastle-upon-Tyne.

Further Records.

For many years the Newcastle-upon-Tyne and Gateshead Company have held an Annual Sale of Appliances. These "sales" have proved a valuable asset and are carried on for two weeks at all the showrooms of the Company. At their twelfth Annual "Sale" held last month the orders for gas consuming appliances exceeded those of the "Sale" of the previous year, as also did the total money value of all appliances. In addition to press, tramcar, and poster advertising, the Company publish and distribute some 40,000 copies of a special 16-page catalogue in two colours, with striking cover, entirely dealing with their "sale."

Orders for over 3500 items of gas consuming apparatus were secured, together with 7700 non-gas consuming items, bringing the total to 11,200 articles.

Although an inducement of "free-hire-first-quarter" was made for gas fires, it is interesting to note that over 70% were sold as against the number taken on simple hire.

British Coal Briquette Industry.

Drawback in Coal Tar Pitch Duty.

The Lords Commissioners of the Treasury, states *The Times*, have approved a scheme submitted to them by the Import Duties Advisory Committee for the allowance of a drawback at the rate of 6s. 2d. a ton in respect of the duty paid on solid coal tar pitch used in the manufacture of coal briquettes.

The Committee, in making their recommendation, said that the production of coal briquettes in this country is mainly for export, but in recent years this export trade has been faced with a rapidly growing competition from countries enjoying the advantages of cheaper costs for slack coal and labour, and in consequence the world prices for briquettes have tended to fall. The difficulties of the British briquette industry have been seriously increased during the past two years by the rapid and extensive rise in the cost of coal tar pitch, due to a world shortage of production, consequent upon the reduced demand for coke in the principal iron and steel producing countries.

Normally the industry draws the whole of its supplies of pitch, as of its other raw material, from home production, but under the abnormal conditions now prevailing in the world market, the demand from foreign briquette manufacturers has forced the price of British pitch to a level at which the home industry, with its disadvantages in respect of other costs, is unable to compete. It has been driven in these circumstances to look to foreign sources for part of its supplies, and it has recently succeeded in contracting for certain importations at a price considerably below that now ruling in this country. It is in respect of these importations that application has been made for drawback of duty.

The Committee note that the annual production of coal tar pitch in this country is also largely for export purposes, and there is no question as to the capacity of the industry, apart from existing price difficulties, to meet the whole normal requirements of the home briquette industry. It is agreed by both industries that the diversion of even a small part of this demand to foreign sources is undesirable, and the Committee understand that negotiations are now in progress from which an agreement may be expected that will render further recourse to foreign supplies unnecessary.

A limit of eight months is fixed for the operation of the drawback, which will be allowed in respect of the average quantity of solid coal tar pitch, 1·7 cwt. per ton of coal briquettes, used in the manufacture of the briquettes. The Order came into operation on Nov. 6.

A Prague Gas Container.

[*From "West's Gas" Summer Number.*

A Spherical High-Pressure Gas Container at the Prague Municipal Gas-Works.

Reduced Price of Morris Commercial Vehicles.

As from Nov. 1 the prices of Morris-Commercial 4-cylinder normal control vehicles are reduced as follows:

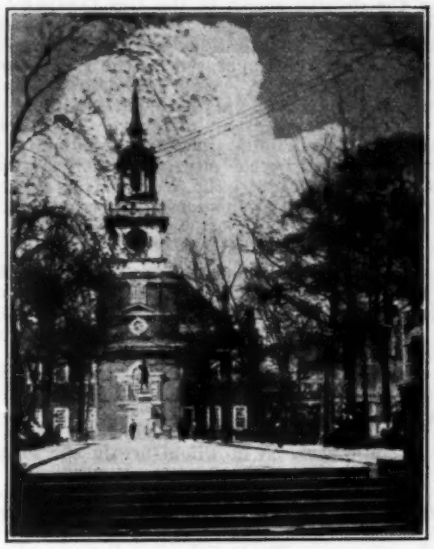
20-cwt. chassis, £189 10s.; truck, £218.

2-ton 11 ft. 2 in. wheelbase chassis, £205; truck, £229.

2-ton 13 ft. 6 in. wheelbase chassis, £212; truck, £235.

These models, forming a part of the range of attractive new Morris-Commercial vehicles, introduced early this year, embody such advanced features as silent twin-top gearbox, triangulated frame bracing, progressive springs, hydraulic four-wheel brakes, finger-tip controls; while the specifications are complete with the latest electric direction indicators, 12-volt 756-watt-hour electrical system, dipping beam headlights, bumper bars, and chromium-plated radiators.

It is worthy of note that, although these models embody such a large combination of modern features, the manufacturers have advanced so far in the perfection of their production arrangements that they can list the vehicles at these low figures. Thousands of these vehicles are now in service, and it is apparent, from the many congratulatory letters received, that their owners are more than satisfied with the performance and economical running of the new Morris-Commercials.



Independence Hall.

PHILADELPHIA

AS SEEN ON THE

INSTITUTION TOUR

BY THE EDITOR

At Philadelphia Railway Station, on Monday evening, Oct. 2, we found friends waiting, eager to greet us and to make preparations for visits on the following day to some of the "high lights" of this historic city. Among those present was Mr. J. B. Klumpp, Chairman of the Reception Committee. We were also pleased to shake hands with a very old friend of the "JOURNAL," Mr. Walton Forstall.

To be in Philadelphia is to live in both the present and the past. Up to date in all that matters, the city is nevertheless steeped in history. If the present is wonderful, with all its ways and means, is not the past equally wonderful, with the pictures that it paints for us? As history goes, that of Philadelphia can hardly be called ancient, but it possesses every other attribute that can appeal to the imagination. No longer ago than about 250 years, Philadelphia, in Pennsylvania, was laid out under a patent granted to William Penn, while to-day it is the third largest city in the United States, and possesses nearly 6500 separate manufacturing establishments. It boasts one of the largest suspension bridges in the world—that over the Delaware River—and absolutely the largest natural park entirely within the limits of any city.

We saw, of course, Independence Hall, in which the Declaration of Independence and the Constitution of the United States were signed, and also in which is to be found the famous Liberty Bell. The Liberty Bell, a reference book tells us, was first cast in London, and bore the motto: "Proclaim liberty throughout the land unto all the inhabitants thereof." It was afterwards recast at Philadelphia, with the same inscription, and it was rung when the Declaration of Independence was adopted by Congress. Adjoining Independence Hall is Congress Hall, in which the first congress of the United States was held, and the earliest national laws were enacted. For some years Philadelphia was the Capital of the country; going farther back, Penn Treaty Park still marks the spot where William Penn signed his treaty with the Indians.

THE FIRST AMERICAN FLAG.

With so much to see in a single morning (for our afternoon had been fully mapped out), none of the party could cover everything, but some of us did make time to call in at the Betsy Ross House, where was made, at the suggestion of Washington, the first American flag, adopted by Congress in June, 1777. This house is now the property of the American Flag House and Betsy Ross Memorial Association, who have kept it in a state of perfect preservation. Entering the small living room, one was able to picture the scene when Betsy was disowned by the Quakers for having given her heart to a youth of another religious persuasion, but it was harder to imagine another scene which took place in the same room two years later, when Betsy, already widowed by a tragedy of the revolution, was listening to Washington, who was seeking her aid in fashioning an ensign for the ships and army. The British forces were not a great way off, and Washington had at last fallen in with the views of those favouring complete separation. He realized that a declaration of freedom would require the adoption of a national flag, and hence his request. Washington showed her a rough design of a flag with thirteen stripes and thirteen stars, and on the following day she was ready with the first sample of "Old Glory."

In Philadelphia, too, was the residence of Benjamin Franklin. He is buried there, and the Benjamin Franklin Memorial (built by public subscription) is in the form of a public museum of Franklin's inventions and experiments.

The Board of Directors of the Philadelphia Chamber of Commerce invited us to luncheon at the Barclay Hotel, where we were received by Mr. John E. Zimmermann, President of the United Gas Improvement Company, and Mr. H. B. Bryans, Operating Vice-President of the Philadelphia Electricity Company. The chair was occupied by Mr. Philip H. Gadsden, a Vice-President of the United Gas Improvement Company, and President of the Chamber of Commerce; while Mr. J. Hampton Moore, Mayor of Philadelphia, extended a hearty welcome to the guests, and speaking of the leasing of the municipally-owned gasworks to the Philadelphia Gas Company, said the city had a very good tenant. They were pleased with both the undertaking and the management. Thanking the hosts sincerely for their entertainment, Mr. Tarratt said he felt sure the Municipality had done well to lease the works to the Company.

UNITED GAS IMPROVEMENT COMPANY'S JUBILEE.

Among the many friends we met while in Philadelphia, in addition to those already mentioned, were Mr. C. W. Hunter, Vice-President of United Engineers and Constructors, and Mr. J. A. Perry, of the United Gas Improvement Company, which calls to mind the fact that last year this Company celebrated their Jubilee. On that occasion President Zimmermann sketched the Company's progress and the scientific and economic changes that had taken place during the past half-century, and his reference to the temporary nature of business depressions is worth quoting here. It may hearten some of our pessimists:

> During the lifetime of the United Gas Improvement Company there have occurred six business depressions, not counting that in which we find ourselves to-day. In all of these depressions, pessimism was the prevailing attitude. Deep gloom surrounded business and industry. No ray of hope could be distinguished, no break in the depression could be seen. The future of the country and of industry was obscure; never again would business return to normal. In fact, in reading accounts of those hard times, one is struck with the similarity of the language used; and, as a matter of fact, in most instances the accounts seem to describe exactly the situation as it exists to-day.
>
> It is unnecessary to call your attention to the fact that better times followed each of these periods; that business and industry did improve; that the country did not go "to the dogs;" and that our national wealth after each of these years of hard times was considerably increased.
>
> So it is with the present depression. I am a firm believer in America and its institutions. I know that this depression will pass away, and that the country will have a return of good times, although I believe that our period of wild prosperity was not worth the bill which is being paid in the form of a great human suffering, destruction of morale, receiverships, bankruptcies, and what not. It is only by eternal watchfulness in the future that we can avoid repeating the excesses of the past.

The "U.G.I. Circle," published by the Company, had a Jubilee Issue, to which Mr. Perry contributed an article dealing with fifty years of United Gas Improvement Company developments. For ten years previous to 1882 there had been considerable invention and development of car-

buretted water gas processes, and the Company was formed for the purpose of combining various construction companies that controlled a number of patents. In a contribution to the British Association in 1889, Dr. A. C. Humphreys, then General Superintendent of the United Gas Improvement Company, said:

> Since Lowe's first works at Phœnixville (in 1874), his process had been gaining ground. A number of firms and companies were engaged in erecting water gas plants under his licences; but no uniformity was to be found in the early " Lowe " gas plants.
>
> In the year 1882 the National Petroleum and Water Gas Company, controlling the Hanlon-Johnston patents, and the owners of the Lowe patents, combined to form United Gas Improvement Company of Philadelphia. Considerable new capital was brought in and the building of water gas apparatus, under the Lowe patent, was put upon a much more solid basis. W. G. Warden, of Philadelphia, a capitalist of practical training, who was thoroughly convinced as to the possibilities of petroleum as a gas enricher, was very prominent in this combination, and was, to a large extent, its parent. W. W. Gibbs, the President of the National Petroleum and Water Gas Company, became General Manager of the United Company. At once this Company started in on a new policy—that of taking the control of gas-works introducing the water gas process, and then operating the works for the profits in the sale of gas. The Company has continued in this line to the present day.

By the end of 1890, U.G.I. controlled, through ownership or lease, gas companies operating in the following cities: Allentown, Pa.; Ardmore, Pa.; Atlanta, Ga.; Bayonne, N.J.; Burlington, Iowa; Columbia, S.C.; Des Moines, Iowa; Fall River, Mass.; Harrisburg, Pa.; Jersey City, N.J.; Johnstown, Pa.; Kansas City, Mo.; Lewiston, Me.; Manchester, N.H.; Marshall, Mich.; Minneapolis, Minn.; Omaha, Neb.; Paterson, N.J.; Pensacola, Fla.; Reading, Pa.; Sag Harbor, N.Y.; Savannah, Ga.; Sheboygan, Wis.; Sioux City, Iowa; Sioux Falls, S.D.; St. Albans, Vt.; St. Augustine, Fla.; Vicksburg, Miss.; Waterbury, Conn.; Wyandotte, Kansas; and Yonkers, N.Y.

Later, in 1924 and 1925, a new and special type of mechanical generator, which was a decided advance, designed by the late J. H. Taussig, was tried out in the Philadelphia Gas-Works Company on an experimental set. In 1925 there was brought from Europe, through Humphreys & Glasgow, the tentative design of an improved type of mechanical grate which, through J. S. Haug, of United Engineers and Constructors (Inc.), in co-operation with Mr. Glasgow, of Humphreys & Glasgow, resulted in a still better design of apparatus.

The U.G.I. automatic control for water gas sets originated with C. F. Zeek, when he was Superintendent of the Pensacola (Fla.) Gas Company. This home-made control used a counterweight and pendulum for timing. Later, J. H. Taussig invented and patented an improved control, which retained a clock and pendulum for timing. The first one of this type was installed at the Experimental Plant in Philadelphia in 1915. This design was further greatly improved and an electric motor was adopted for timing the mechanism.

Valley Forge.

To return now, for a minute or two, to the older history of Philadelphia, it should be said that, after lunch on the day we spent in the city, we were taken for a drive to many points of interest, including Valley Forge, which heroism has rendered ever memorable. Towards the close of 1777 Washington arrived there with an army of about 11,000 officers and men; and during a winter of terrible hardship he lost more than one-third of them through starvation, freezing, and smallpox. We visited the Washington Memorial Chapel, and saw the National Carillon, dedicated in 1926 in commemoration of 150 years of American Independence. The farmhouse occupied by Washington as his headquarters was pointed out to us, as well as many other spots connected with his campaign.

Finally, before returning to the city, we were the guests of Mr. C. H. Geist, a Director of the United Gas Improvement Company, and his wife and daughter, who hospitably entertained us in their beautiful country mansion. The extensive grounds, with their swimming pool, illuminated fountains, and other delights, were greatly enjoyed, but their attractions did nothing to dim the brightness of our welcome.

On the professional side, there was a choice of visits on the Tuesday morning, members of the party being free to go to the " gas reforming " plant at Chester, the water gas making station of the Philadelphia Gas-Works Company, the coke oven plant of the Philadelphia Coke Company, or the display rooms of the Gas Company and the Electric Company. The gas supply of Philadelphia is noteworthy for the fact that the works belong to the City of Philadelphia, but are operated by the Philadelphia Gas-Works Company, under a lease granted to the United Gas Improvement Company. This lease is terminable on notice from either party at intervals of ten years. Gas has been distributed in Philadelphia since 1836, and until 1898 the works were operated by the city. In that year, they were leased for thirty years to the United Gas Improvement Company. At the end af this lease, it was renewed.

GAS DISTRIBUTION.

With a population of 2,000,000, there are about 475,000 meters in use, and 2021 miles of main. With regard to apparatus installed, there are approximately 405,000 gas ranges, 240,000 gas water heaters, 8500 gas refrigerators, and about 3000 house heaters centrally fired. Gas refrigerators are now being installed at the rate of some 500 a month. It was learned that during September the Company sold 7000 gas cookers, and that they refuse to sell any not having a temperature control device. The Company have 2800 employees, 58 of whom are in the Distribution Office.

The Customers' Service Division, with 300 employees, looks after all of the work required by customers beyond the end of the service pipe, including installation and servicing of appliances. Most of the installation is done either the same day or the day after the appliance is purchased.

The Transportation Division operates 229 vehicles and 137 bicycles. The vehicles are all maintained in tip-top shape, and the average maintenance and operation cost does not exceed 4 cents a mile. This does not include overhead or fixed charges. About 500,000 hours and 2,000,000 miles are the figures for one year.

Accounting.

There is a modern building of six storeys which houses most of the business activities of the Company. Recently all customers' accounting has been consolidated from seven district offices to one centralized office in this building. This new system is probably one of the most modern and unique of its kind found anywhere in the country. With new equipment and new methods, both gas and merchandize accounts are kept up to date at all times, while each customer's account is instantly available for reference and information. It is possible to observe on one floor the entire customers' accounting of the City of Philadelphia (475,000 meters), including the actual billing for both gas and merchandize, the entering of all meter orders, posting and balancing of accounts, records of all deposits, and all credit and collection activities. Recently the new Burroughs mechanical accounting system has been applied to the following branches of accounting: (*a*) Labour, (*b*) material, (*c*) transportation, (*d*) accounts payable, (*e*) operating ledger, and (*f*) general ledger. Gas accounts are rendered monthly.

Telephone Service.

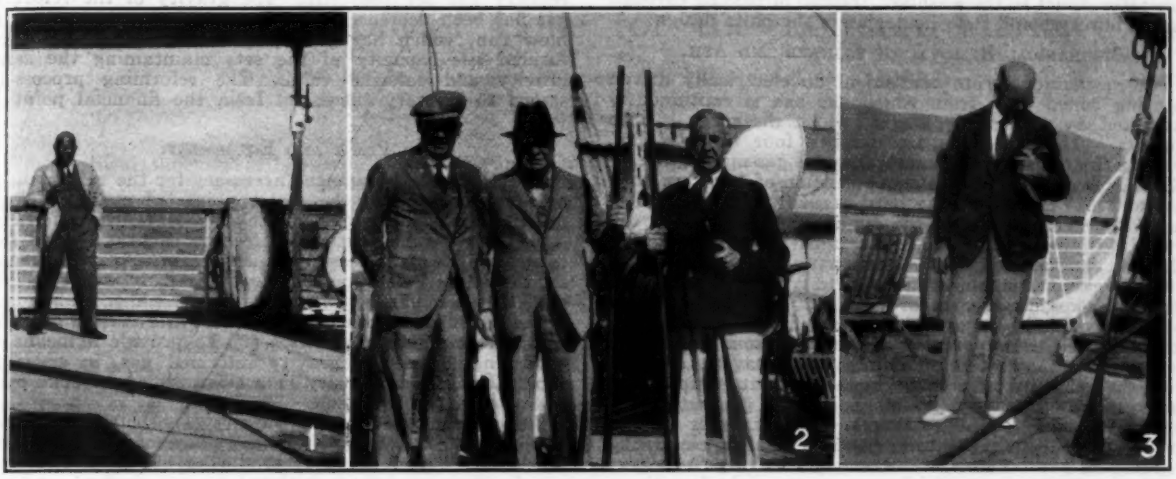
Perhaps the most interesting and the most advanced development to be seen in the Company is the new telephone and order receiving system. This installation is the second of its kind in America, and is the first of its kind to be adopted by a public utility. The system is the very heart of the commercial and distribution centralization plan. Through it, all telephone contact with the public is received on the one hand, and all the various specialized items of service and information are made immediately available to the public on the other.

As a result of this system, it is necessary for a customer to state his story but once. He can listen to all subsequent discussions within the Company concerning his problem, and is given more complete and more prompt information and service than has ever been accomplished before.

At the top of the building the most interesting feature is the series of ample and well equipped facilities for employee training. These include conference rooms, an appliance training section, the model kitchen, and the auditorium.

MAIN AND SERVICE LAYING.

In the Street Division, with its 200 employees, machinery has been employed increasingly during the last few years. Mains of 12 in. and over in size are usually laid by means of a crane mounted on a truck. This is also used with a " grab " bucket to excavate, and often to refill, even where the refill has to be tamped. Great use is made of air compressors, most of which are mounted on a half-ton Ford chassis. The cost of each equipment is about $3000, and the useful life is about 15,000 hours. Recently, it has been found that the use of a compressor under the hood of a motor truck is superior to the use of a compressor alone,



(1) Mr. Fritz Escher, of Zurich, President of the International Gas Union. (2) Mr. George Helps, of Nuneaton, who has on his right Mr. George Helps, Jun., and on his left Mr. H. F. Cotton, of Dublin. (3) Mr. Frank West, of Friden.

because with the compressor on the truck the men and compressed air can both be carried by the same vehicle.

Under Philadelphia conditions, it is possible, in renewing existing services, to drive out the old service with the new service by means of compressed air, and, by the use of special tools, to connect the new service to the main through an opening only 1 ft. square.

Mechanical Digging.

The Company own a Barber-Greene Digger and a Cleveland Baby Digger, both of which can be used to excavate trenches under suitable conditions for mains which can be installed in an 18-in. trench. The Barber-Greene is the heavier and stronger of the two, but for the Company's work the Cleveland can be used more extensively, because it can be easily mounted on a light trailer and quickly hauled from job to job. In spite of the fact that the Barber-Greene is built to dig only an 18-in. trench, the Company have successfully dug trenches wide enough to lay a 20-in. main by the expedient of breaking the paving and the concrete base to the proper width for a 20-in. trench, letting the digging machine span this trench, and breaking down the extra width of earth with a pneumatic spade. This earth falls into the trench in front of the digger's buckets, and almost all of it can be thus removed. Consequently, the Company consider that the real capacity of the Barber-Greene machine is from 4-in. main to 20-in. main, though it is more difficult to dig this extra width, and sometimes impossible, unless the machine is digging in a paved street where the paving will give the machine an extra good foundation. Of course, the caterpillars run on a timber track 12 in. wide, which is laid as the digger proceeds.

In 1932 the Company excavated 22,400 lineal feet of trench, most of which was for 4-in. and 6-in. mains, and practically all of which was excavated by the Cleveland. The average depth was probably 45 in. The cost per lineal foot was 12·6 cents, and the average speed per hour was 42 ft.

The Company keep no separate costs for excavating by the clam shell bucket with which their mobile crane is equipped. If excavating were the only purpose for which this crane could be used, it would not be economical. However, as long as it is employed for laying pipe, or back-filling, and for loading and unloading trucks, it is economical to use it on every other operation possible.

Mechanical Back-filling.

To back-fill the trenches, when conditions permit, the Company use a tractor of the Fordson type with a blade, adjustable in height, mounted at an angle in front of the machine. The use of this equipment is feasible in semi-suburban work, but not very frequently on any paved street. This naturally considerably limits the use of mechanical back-filling.

Labour-Saving Devices.

One of the outstanding features of a list of labour-saving devices on distribution work is the extensive use which is made by the Company of compressed air on their street work. The Company have about fifteen compressors, most of which are by the Ingersoll-Rand Company, with a capacity of slightly over 100 c.ft. of air per minute. In 1932 these compressors were in use 26,000 hours out of a total of 42,500 possible theoretical hours.

WATER GAS MANUFACTURE.

The Philadelphia Gas Works Company have two plants in the city, one in the southern part on the Schuylkill River, and the other in the north-eastern section on the Delaware River. It was the latter that we were invited to visit. The Company also purchase coke oven gas from the plant of the Philadelphia Coke Coupany.

The plant at this station is for manufacturing carburetted water gas, and it has a capacity, when every machine is running, of about 50 million c.ft. of 530 B.Th.U. gas per day. This gas is made in two houses, one of which is equipped with hand-clinkered sets, while in the other there are the more modern mechanical generator sets. The three mechanical generator sets in the latter house were built by United Engineers and Constructors (Inc.), a United Gas Improvement Company subsidiary, and in general are similar to those built by Humphreys & Glasgow, of London. As now operated they each make about 5¼ million c.ft. of carburetted water gas per day. They can be operated to a capacity close to 6 million c.ft. They are provided with all the modern devices which have been proved to be desirable in carburetted water gas manufacture. These include the United Gas Improvement heavy oil process, the Steere back-run, the mechanical removal of clinker and ash, the use of exhaust steam, waste-heat boilers, and automatic set operation.

U.G.I. Heavy Oil Process.

The United Gas Improvement heavy oil process, a system in general use throughout the East, where the substitution of heavy or fuel oils for the so-called "gas oils" has proved most economical, consists briefly in admitting secondary air through a series of openings to the top of the generator fire, removing all of the checker-brick from the carburettor, and checkering the superheater in the usual way. Oil, which in most cases has to be heated to reduce its viscosity to a point where it can be handled, is admitted simultaneously to the top of the fire and to the carburettor during the up-run, and during the back-run some of the oil, which may amount to as much as 30% of the total oil, is admitted to the carburettor.

This back-run oil is decomposed during its passage down through the fuel bed, producing a large yield of low B.Th.U. gas. This operation is known as "reforming." The use of the reforming process results in a decrease in the generator fuel and an increase in the oil consumption, and the economy of operation depends upon the relative values of these two sources of energy.

The carbon deposited from the oil admitted to the fire on the up-run and from the reformed oil is caught by the generator fire and used as fuel. Such of the carbon deposited in the carburettor as is not burned during the blow is accumulated and must be removed at intervals depending upon the kind of oil used. At the station visited this removal takes place three times a week.

The Steere back-run consists in so arranging the set that the back-run or down-run gas flows from the bottom of the

generator direct to the washbox, instead of passing through the carburettor and superheater as in the older design.

Mechanical Removal of Clinker and Ash.

The mechanical grate consists of an electrically driven rotating coned disc, from which the ash is continuously extracted by means of ploughs, which discharge it into hoppers. These hoppers are dumped four times a day, without the necessity of interrupting the gas-making operation. This results in a uniform condition of fire from hour to hour, and eliminates the hard manual work of clinkering. In order to facilitate the removal of such clinker, the lower portion of the lining consists of a water jacket in which is generated low-pressure steam which is discharged into the exhaust steam system. The refuse from the ash hopper is treated in a recovery plant, where the usable coke is recovered by a system of water flotation and agitation, in which the separation of the coke from the clinker is obtained through differences in specific gravity.

All the exhaust steam throughout the plant is piped into one system, which supplies steam to the generators for decomposition into blue water gas. Any excess is used in low-pressure steam generators, either generating electricity or pumping gas. The waste blast gases leaving the superheater are put through a high-pressure steam boiler, where much of the heat is extracted.

The valves on the sets themselves are mechanically operated by a United Gas Improvement design apparatus, so that the main duty of the gas-maker is to see that conditions once set are maintained, and to shut-down the machine for coaling purposes. The generator fuel is oven coke.

Cooling System.

The gas is cooled through a battery of six United Gas Improvement design condensers using fresh river water through 1¾-in. outside diameter tubes. Each condenser has eight gas passes, and the area of these passes is reduced as the gas cools, so as to maintain practically uniform gas velocity throughout. Under these conditions the gas can readily be cooled to within 4° of the temperature of the inlet water. The hottest water from the condensers is then treated with chemicals and used for boiler feed.

In conjunction with the condensation system there is installed a refrigerating plant, by which 1,000,000 c.ft. of water gas per hour can be cooled down to a temperature of about 40°. This plant was installed to reduce the amount of oil drip condensing out of the distribution system, in an effort to overcome gum troubles. At present it is not in operation, because the gas is condensed to such a point that there is no oil condensed beyond the works.

The water gas is metered through Roots meters, and then mixed with the coke oven gas purchased from the Philadelphia Coke Company. The gas storage capacity at this plant consists of seven holders, in addition to the relief holder, having a total capacity of 25 million c.ft. The largest of these is of 10 million c.ft. capacity, and is of the "M.A.N." waterless type, built by the Bartlett-Hayward Company in 1932. One of 3 million c.ft. capacity is the coke oven gasholder, into which the Philadelphia Coke Company pumps their gas, from which it is drawn out for admixture with the carburetted water gas.

All readings of calorific value are made on recording Thomas calorimeters, which are periodically checked against a Junkers instrument. An average throughout the twenty-four hours of not less than 530 B.Th.U. is required to be maintained at testing stations located a mile from each works. The uniformity of the heating value of the gas is evidenced by the fact that for the past twelve months the minimum daily average (which is the average of twenty-four hourly readings) was 530 B.Th.U. and the maximum 534 B.Th.U.

CHESTER REFORMED GAS PLANT.

The reformed gas plant at Chester has recently witnessed a remarkable growth. With the installation of one mechanical generator in the latter part of 1930 and the completion of another in early 1931, the generating capacity of this plant will be doubled from 14,000,000 to 28,000,000 c.ft. daily of 520 B.Th.U., 0·633 gravity gas. This expansion is due to low holder costs permitting the pumping of high-pressure gas to Reading (Pa.) and Wilmington (Del.), replacing carburetted water gas at an appreciable saving.

The marked reduction in price of bunker oil has resulted in a lower thermal cost in the purchase of refinery gas. Prior to September, 1930, the cost per therm of oil gas was higher than that of coke, which condition favoured low oil gas and high generator fuel per 1000 c.ft. After receipt of additional gas from the Sinclair Refinery the economics were reversed. The change in operating conditions has not contributed any new difficulties due to using more refinery gas per 1000 c.ft. The gravity of the reformed gas has been decreased, permitting a larger percentage of blow run, which has greatly increased the enriched reformed gas capacity of the sets maintaining the same gravity and calorific value. The reforming process is stated to be very successful from the financial point of view.

Plant and Equipment.

The plant and equipment necessary for the reforming of refinery oil gas and the major points of operation were described in a paper presented by Mr. R. G. Rincliffe to an American Gas Association Conference in 1930. From this it appears that the reason for development of this process by the United Gas Improvement Company was twofold: (1) To utilize refinery oil gas, a product which is abundant in the metropolitan Philadelphia area, at a mutual profit to both oil and gas industries. (2) To provide a means of producing a variable gravity reformed gas, in order to supply a constant gravity in a territory where coke oven gas supplies the base load.

The oil refinery supplying the oil gas is located at Marcus Hook (Pa.), a distance from the plant of approximately 20,000 ft. This refinery is producing gas from two processes. The gas delivered, therefore, is a mixture, and the ratio of the two kinds of gases as received varies quite widely. The calorific values of the refinery gases depend upon still operation and the crude stock used, varying from 1300 to 1800 B.Th.U. per c.ft., and the specific gravity will vary between the limits of 0·95 and 1·1. The wet refinery gases are cooled after leaving the stills, and are compressed to remove as much of the condensable gasoline vapours as possible, so that the gas as delivered to the reforming plant is relatively dry, and is available for delivery under high pressure without further compression. The gas is metered at the point of delivery, through a high-pressure positive displacement type meter, and the pressure to the meter is maintained as uniformly as possible by means of suitable governors, to reduce to a minimum errors in calculating the average delivery pressure. Duplicate meter and calorimeter installations are in use at the receiving and delivery points, and the readings taken at the two plants check within 1%. After metering at the gas plant, the refinery gas passes to the high-pressure storage holder, which is a riveted steel tank.

The oil gas after purification is ready for reforming. The apparatus consists of standard water gas equipment, arranged to use oil gas. The set at Chester is a 9 ft. internal diameter U.G.I. self-clinkering generator, with carburettor, superheater, and wash box, and equipped with Chrisman cycle and waste-heat boiler.

The cycle used differs appreciably from the carburetted water gas cycle, since it is not necessary to maintain high carburettor temperatures. However, there must be sufficient temperature in the fuel bed to give the desired degree of cracking or breaking-down of the refinery gas into the lower gravity, lower heating value hydrocarbons. The cycle itself and the rates of flow will depend upon the character of broken-down gas desired. If a low gravity gas is necessary, higher heats must be carried to crack the methane effectively. If low gravity is not essential, lower heats may be carried, in which case the total methane leaving the generator sometimes exceeds that in the oil gas entering.

The cycle controls to a large extent the fire condition and a proper fire condition is essential to satisfactory operation, both from the reforming standpoint, and to control the formation of lamp black, tar, and naphthalene. Very little trouble has been experienced with the use of the standard wash box in this operation. It is inspected periodically after about 700 running hours, and the deposit found has been mostly coke breeze which accumulates during the down-run. In case of a refinery gas failure, the operation may be changed to carburetted water gas on one hour's notice; it being necessary only to bring up the carburettor heats to the proper point for gas oil cracking. Carburettor and superheater inspections after 2100 running hours showed practically no deposit of any kind, owing to the efficiency of the cyclone dust arrester, located between the generator and the carburettor.

The reformed gas in the relief holder will have an average calorific value of about 437 B.Th.U. per c.ft. depending on the cycle used and is brought up to the Pennsylvania Standard of 520 B.Th.U. by enriching with refinery gas. This enriching gas is injected into the reformed gas main before the Cottrell inlet by means of a Cutler-Hammer automatic control working in conjunction with a motor operated Dean valve. In general the operation of the Chester plant has been found to be very flexible, from both the standpoint of daily make and gravity. Maintenance has been low, and production cost to date has been below that estimated.

The Preparation of Coke for the London Market*

By F. M. Birks, Mechanical Engineer, Gas Light and Coke Company.

[Extract.]

The post-war shortage of houses in London, as in most large cities, together with the modern tendency to small domestic establishments, has resulted in a gradual change in the methods of heating. The English people are gradually being forced by circumstances to give up or to curtail the use of the open coal fire. The conversion of large houses into several flats has made the storage of solid fuel difficult, more especially when of a dirty character such as coal, while the attitude of the public towards labour-saving limits to a great extent the use of such fires on levels above the ground floor.

The Gas Industry has profited by the open fire tradition and the use of one or more gas fires is usual in most houses, while a great number of modern dwellings are fitted throughout with this type of fire. In many cases solid fuel is still retained in one room—*i.e.*, the sitting room.

Such a house is invariably fitted with a coke boiler to supply the necessary domestic hot water requirements, and in many such cases one or more radiators are added to the system. The demand for a suitable fuel for this type of boiler has been increasing for some years.

In addition, the British public are becoming increasingly conscious of the need to abate the smoke nuisance, and there is a considerable interest shown in various smokeless fuels which have been put on the market during recent years. This feeling, together with the penalties attached to the emission of smoke from factory chimneys, has encouraged the use of gas coke for many industrial purposes, while on a large number of open fires, various forms of smokeless fuel are being burnt.

In 1913, the London Coke Committee was formed with the object of promoting the use of gas coke for fuel purposes, and they engaged a qualified technical representative to undertake this work. The Committee was composed of members of the undertakings supplying gas to London and its suburbs. Among its many activities a special technical Sub-Committee was formed and arranged a standard form of grading coke that would be suitable for specific purposes, having special regard to the many sizes of domestic boilers which are in use in the London area, and which could be generally adopted by the undertakings forming the Committee.

In 1931 the London and Counties Coke Association was formed and took over the activities of the London Coke Committee, extending and amplifying its work over a wider area in the Home Counties.

In this paper, the author proposes to set out briefly the efforts made by the Gas Light and Coke Company (the largest gas undertaking in the world) to meet such requirements. The Company owns and operates thirteen works and supplies an area of 545 sq. miles. The carbonizing plant at the works owned by the Company consists of horizontal and continuous vertical retorts, intermittent vertical chambers, and horizontal ovens. Four distinct classes of coke have therefore to be considered.

The Company has laboratories and a full equipment including experimental carbonizing plant at Fulham, where continuous research is undertaken both to ensure that the various classes of fuel made adhere to a rigid standard of quality and to endeavour to produce new methods of manufacture and treatment which will improve the products. In addition, the Company is engaged in experimental work with the object of promoting improvements in apparatus for the full automatic control of domestic and heating boilers, so as to encourage the use of plant which will operate for at least twenty-four hours without attention.

The density of each class of coke is different and there is a difference in their combustibility. The weight per cubic foot of graded cokes is as follows:

Class of Coal.	Weight of Coke above 2 In. on a Dry Basis.
	Lbs.
Coke oven	27
Intermittent vertical chamber	26
Horizontal retort	26
Continuous vertical retort	18 to 22

The fact that the different types of coke are produced makes it possible for the Company to supply a size and quality to meet any requirements. In addition, considerable research has been undertaken to produce a smokeless fuel suitable for use on the open grate. The Company equipped one of its smaller works with a complete low-temperature carbonizing plant, which was operated for two years, and which produced an excellent quality smokeless domestic fuel, but the financial results of this method of carbonizing were found to be disappointing and did not warrant the continuation of this full-sized experiment.

The activities of the research section dealing with this work were therefore concentrated on producing a fuel made by the normal high-temperature process, and it was found that large coke made in continuous vertical retorts under certain conditions, when cut to a suitable size, would burn clearly and brightly in open grates.

To add to the convenience of using this fuel, which is marketed under the name of "Cleanglow," the Company recommends the use of grates fitted with special gas burners, which, on being lit for a period of about eight minutes, ensure certain ignition and a cheerful fire within a quarter of an hour.

The following sizes of coke are made:

Sizes of Coke.	Vertical Continuous and Horizontal Retorts.	Coke Ovens and Intermittent Chambers.
No. 1	Over 2 in.	Over 1⅞ in.
No. 2	1¼ in. to 2 in.	1⅛ in. to 1⅞ in.
No. 3	⅝ ,, to 1¼ ,,	⅝ ,, to 1⅛ ,,
No. 4	⅜ ,, to ⅝ ,,	⅜ ,, to ⅝ ,,
Breeze	0 ,, to ⅜ ,,	0 ,, to ⅜ ,,

It will be noted that in certain grades the denser cokes are sized somewhat smaller than the lighter cokes.

To ensure that the classification is maintained so that there is a minimum variation in size, independent snap samples are taken at frequent intervals by members of the Chief Gas Chemist's staff, who report the proportions of the sample which passes through British Standard test screens, which are provided, varying in the mesh in increments of ⅛ in. throughout the range of the size being tested.

Quenching.

Most of the horizontal retort houses are fitted with drag chain conveyors, into which the hot coke is discharged, the coke being quenched by water sprays. The Company recently fitted three retort houses with flume coke conveyors. These conveyors consist of troughs into which the coke is discharged from the retorts. The coke is floated by a stream of water to the outside of the building where the troughs terminate at drainage wheels, the buckets of which are made of perforated plates. The wheels lift the coke, which is separated from the water, and discharge it on to belt conveyors. The water, after passing through settling pits, is returned to the troughs by means of powerful pumps. The fine breeze is removed from the pits by means of grabs on to drainage shelves, whence, after draining, it is re-loaded by the same means into rail trucks.

The maintenance of this system is found to be half that of the older system. The water content of the coke is as follows:

Above 2 in.	1·5%
⅔ in. to 2 in.	up to 6%

The intermittent chamber oven coke is discharged into skips which are run on cars through quenching towers and afterwards handled by means of overhead cranes.

The oven coke is quenched by the usual coke car and quenching tower system.

The coke from the continuous vertical retorts is discharged sufficiently cool from the retorts not to require further quenching.

Conveyors.

On all the modern plants the cold coke is conveyed by means of belt conveyors. These follow standard practice. All gears are now totally enclosed and run in oil baths, and flexible couplings are provided between the motors and the gears so as to isolate the electrical machinery from any vibration which might be set up by worn gears, as this has been found to be a frequent source of breakdown due to hardening and subsequent breaking of copper connections, as well as causing excessive wear to slip rings and commutators.

* Paper read before the Annual Convention of the American Gas Association.

Coke Crushing.

As previously mentioned, the Company's special smokeless fuel is prepared by crushing large continuous vertical coke. It has been found that not only is this large coke free from shale, but the resulting product has better combustibility than similar sized fuel prepared by grading from run-of-retort house coke.

The demand for the boiler nut size ($\frac{5}{8}$ in. to $1\frac{1}{4}$ in.) has now far exceeded the supply obtained by screening, so that it has been necessary to resort to crushing.

The cost of crushing is primarily influenced by the loss due to de-grading high value coke to low value breeze, so extensive experiments have been carried out with various types of crushers. A special test plant was erected in which two distinct types of plant were tested by running through measured quantities of coke above 2 in. in size and analyzing the resulting product.

One machine was fitted with manganese steel cutters mounted on two rolls. These rolls are driven at slightly different speeds so that there is a differential movement between the cutters on one roll and the cutters on the other, by which arrangement the makers claimed that the coke was cut and not crushed, thus lessening the breeze made. The other machine was of the single roll type working against a serrated back plate.

The results show there is little or no difference between the products of either machine.

From experiments and working experience it has been deduced that the desirable features in crusher design are:

(1) A single roll machine provided with a spring mounted back plate, designed to prevent damage from the passage of tramp iron.
(2) As the function of the teeth on the roll is only to ensure that the coke shall be drawn through the machine, that they should be of as simple a design as possible and of such a shape as will enable them to resist abrasion from the coke.
(3) That the roll shall be mounted in such a manner as will allow it to be readily removed for repair without disturbing the driving gear.
(4) That the gear drives should be totally enclosed in a dust-tight oil bath.

Screening.

The general lay-out of screening plants built during recent years allows the larger coke—*i.e.*, above 2 in.—to be separated first, so as to limit materially the tonnage passing over the smaller mesh screens.

Until recently, rotary grizzley screens were used for this operation, as they were the only type then available which would deal with large throughputs in single units, but it has been found that the wear on this type of screen is considerable and classification is thereby rendered inaccurate.

Now that vibratory types of screens can be obtained to deal with relatively large quantities, this type is gradually being substituted.

To deal with the smaller sizes, vibratory screens are now generally used. Screens of the resonance type have recently been introduced. Several different arrangements of screens can be built, and one which is in course of being erected includes a preliminary separation of the over 2 in. coke, which can be discharged either direct to the hoppers or passed through a crusher and the resulting product delivered to the smaller screens. A minor but valuable point on many screens now designed in Europe is that the screening elements are fixed by simple wooden wedges, which enable them to be changed in a few minutes. There is no tendency for the wedges to work loose in operation.

Coke Cleaning.

The coke produced in ovens contains no free shale, as the coal preparatory to carbonizing is crushed by means of hammer mills to a maximum size of $\frac{1}{2}$ in. On the other hand, coke produced by vertical chambers or vertical and horizontal retorts contains about $1\frac{1}{2}$%-2% of free shale as the coal is not crushed below a maximum size of $1\frac{1}{2}$ in. cube.

The elimination of this free shale is essential, owing to the prevalence of small boilers, which have a very small grate area and are inclined to be rapidly choked by this material, which will not pass through the fire bars.

The general method of extracting the shale has been to wash the graded coke by means of trommel water washers. The result as far as cleanliness of the product is concerned is excellent, but the present method of stocking the coke from the screening plant in overhead hoppers, from which it is loaded direct into motor lorries for delivery to the customer, does not allow sufficient time for the water to drain from the coke, and to prevent the coke being delivered in a wet state to the consumer. It has therefore been found necessary to remove all washed nut size from the hoppers, and to place into heaps for a sufficient period, say, seven to fourteen days, so that it may be delivered free from moisture.

The additional cost entailed is considerable, and the Company installed a dry cleaning process at their Southall works in 1932. The coke graded to $\frac{5}{8}$ in.-$1\frac{1}{4}$ in. is delivered on to a cleaning deck which is formed of perforated steel plate, reciprocated at high speed; air at a few inches water gauge is forced through the perforations; the coke floats along the deck, the light pieces rising to the top, while the heavier shale sinks to the level of the deck. Diagonal steel riffle strips deflect the shale to one side of the discharge end

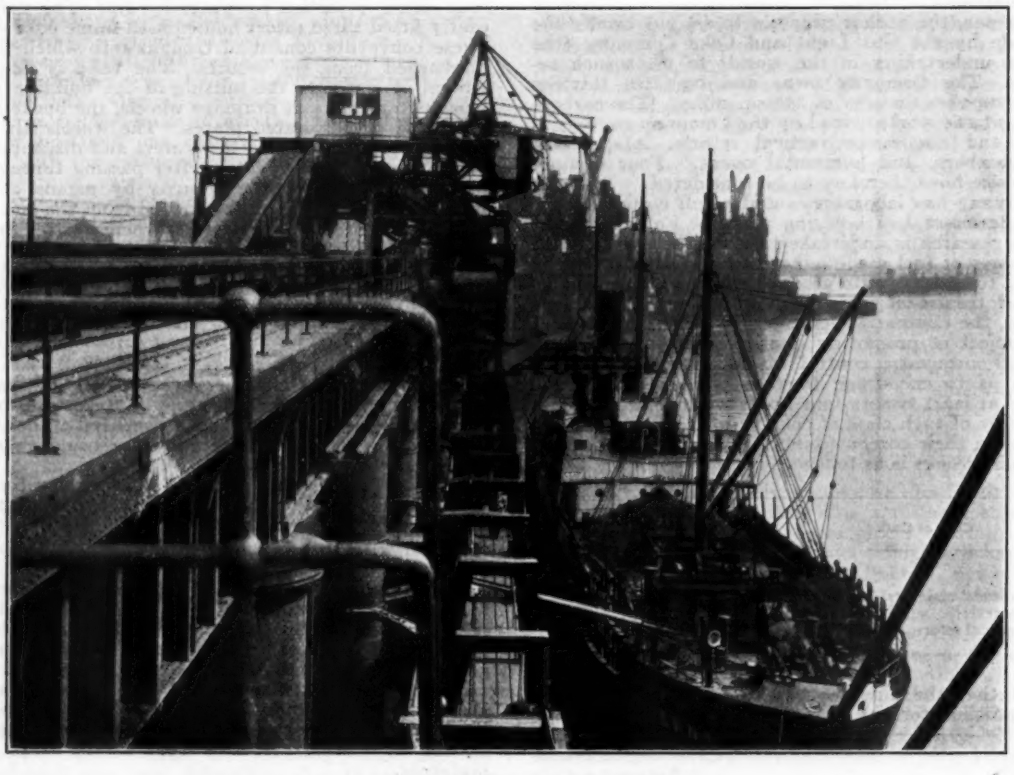


FIG. 1.—COKE SHIPPING PLANT, BECKTON.

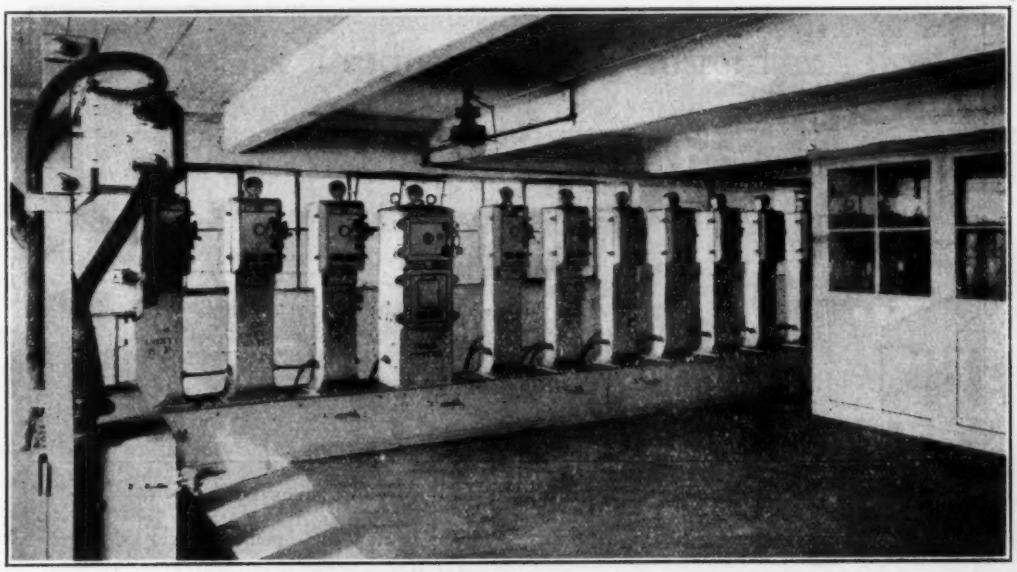


FIG. 2.—COKE PLANT CONTROL ROOM.

of the deck, and the cleaned coke is discharged at the opposite side.

To ensure that the dividing line between the shale and the coke is sufficiently clean cut so that there is a minimum loss of coke when the plant is abstracting the maximum amount of shale, a third spout situated between the two discharge points re-delivers by means of a conveyor about 10% of the throughput back to the inlet of the cleaning deck.

The air, after passing through the cleaning deck, is freed from dust by means of a dust eliminator of the bag type. The wear and tear with this system will probably be less than with water washing, and the finished product is greatly superior. The Company are extending the same system to plants at other works.

Storing.

The coke, after classification, is stored for immediate use in hoppers of reinforced concrete. Coke which cannot be disposed of immediately is usually stored unscreened in heaps. In certain cases, mechanical delivery of the coke to the heaps is provided, and tunnel conveyors enable a great proportion of the heaps to be reclaimed, but where the heaps are required to be turned over only once per annum it has been found most economical to build up the heaps by tipping from rail wagons and to reclaim by means of steam or electric navvies.

Loading and Weighing.

After storage in the hoppers, the classified coke invariably suffers by abrasion, and all discharge points are fitted with re-screening apparatus to remove any undersized coke thus made.

A considerable proportion of the coke sold for domestic purposes in London is delivered in sacks each containing 112 lbs. In the re-screening plant the screens are of the vibratory type, the driving gear of which is interlocked with the discharging doors and the weighing apparatus. The weighing is carried out with extreme accuracy and with great dispatch. Any vehicle delivering coke to customers is liable to be stopped at any time by the London County Council Inspectors, who may claim to have the

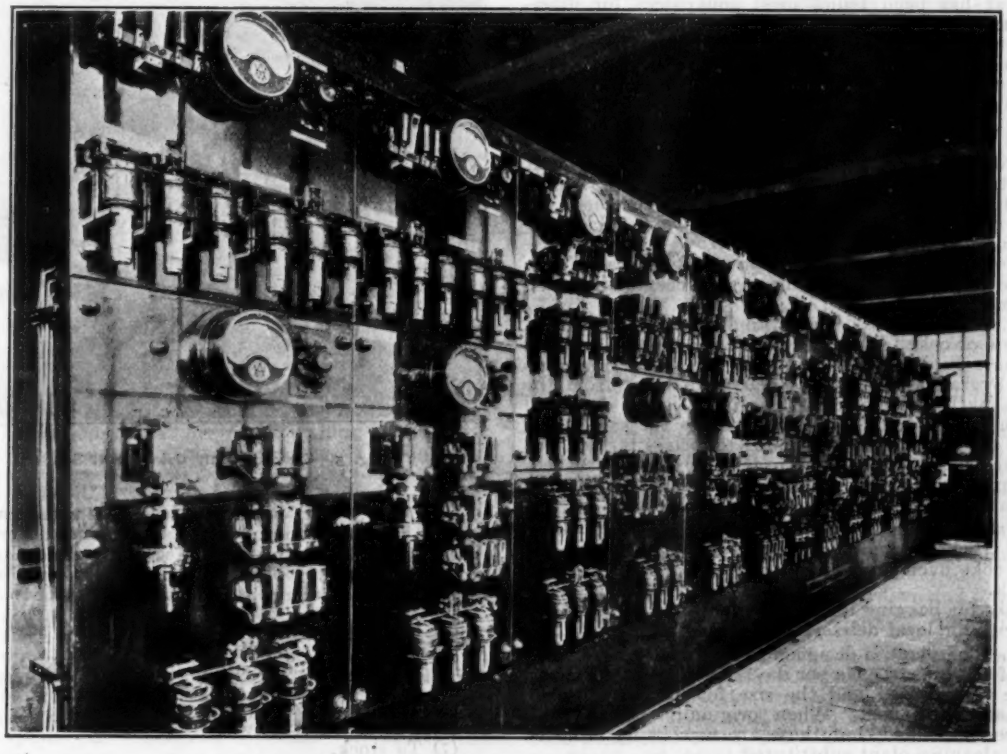


FIG. 3.—CONTACTOR STARTER PANELS, FRONT VIEW.

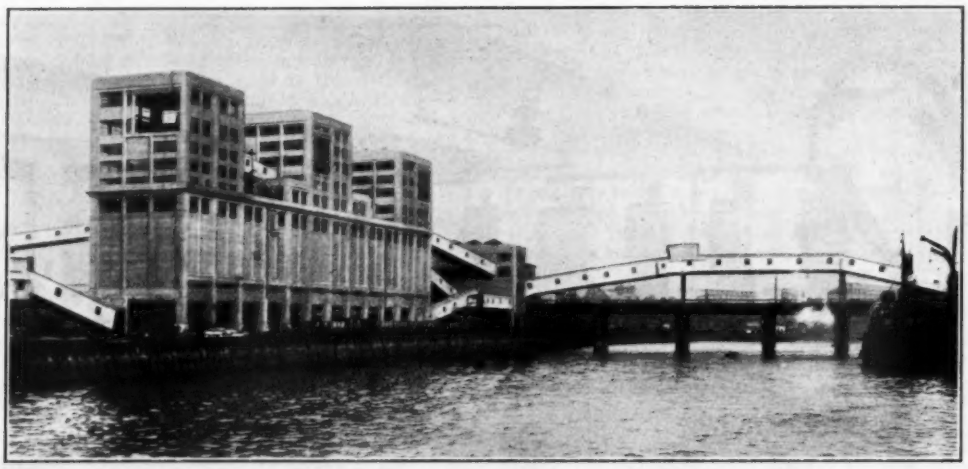


FIG. 4.—COKE GRADING AND STORAGE PLANT, BECKTON.

whole load re-weighed on their standard machines, and each sack must comply individually with the correct weight.

Shipping.

A certain quantity of coke is shipped to Scandinavia and other countries, and comes mainly from the Beckton works, where deep water berths in the River Thames allow ships of 4000 tons register to be loaded.

Electrical Equipment.

All screening and conveying plants are electrically driven by motors which are built to the Company's rigid specification to ensure that they are absolutely dust tight. The machines up to about 15 H.P. are totally enclosed with no special cooling apparatus, but above that power they are of the frame cooled type with a closed cooling system. Most of the switchgear is totally enclosed and all completely interlocked with special sequence selectors to enable the flow of the coke to be changed in several predetermined directions. Some of the plants have up to thirty motor starters, and although these are concentrated in one spot, the time required to start up by hand control is considerable. In addition, the total enclosing of the whole apparatus makes difficult any alteration or repairs to the complicated interlocking circuits.

The latest designs of plants have been fitted with open type contactor starters, housed in dust-tight rooms. This arrangement has been found most convenient for maintenance and alteration, while the time required for starting up can be reduced and retained at a minimum.

This arrangement allows of starting by push button from some convenient point, while the stopping is arranged in such a manner that on pressing the stop button the feed to the inlet of the plant is stopped instantly, while the remainder of the plant continues to run for such time as will allow the whole of the belts to be cleared of coke so that the next start takes place with empty belts.

In addition, emergency stop buttons are provided at numerous points, which will stop the whole plant instantaneously.

The following is a short description of several of the larger coke handling and grading plants recently installed by the Company.

Beckton.—The plant is designed to deal with a maximum of 4600 tons of coke, delivered daily from the carbonizing plant. The coke is brought from the ten retort houses to the plant by rail trucks, but is delivered direct from the coke ovens by belt conveyors. The plant is not arranged to wash and clean domestic boiler coke, as the sale in the vicinity of the works is not large for this class of fuel, but to meet such demand as exists large coke can be crushed, for which purpose crushers have been installed.

The plant is arranged to deliver sized coke to:

(1) The shipping berth for export or river borne trade.
(2) Rail trucks for inland transport.
(3) The coke oven producer plant.
(4) Stock.
(5) Berths for bagging for local trade.
(6) Lorries for local delivery.

Fulham.—The plant is designed to deal with an ultimate capacity of 920 tons of coke per day. It is arranged to cut large coke as required and the size for use on domestic boilers can be cleaned. When originally built, water washers were installed, but these are now being removed and a dry cleaning plant substituted.

The plant is arranged to deliver sized coke to:

(1) Rail trucks for inland transport.
(2) Berths for bagging for local trade.
(3) Lorries for London and district delivery.

Nine Elms.—The plant is designed to deal with an ultimate capacity of 400 tons of coke per day. This plant is also provided with crushers and water washers and is arranged to deliver the sized coke to:

(1) Rail trucks for inland transport.
(2) Berths for bagging for local trade.
(3) Lorries for London and district deliveries and works' use.
(4) The producers of the carbonizing plant.

Southall.—The plant is designed to deal with an ultimate capacity of 860 tons of coke per day. Crushers and a dry cleaning plant for domestic boiler coke are provided. It is arranged to deliver the sized coke to:

(1) Barges for canal transport.
(2) Rail trucks for inland transport.
(3) Berths for bagging for local trade.
(4) Lorries for London and district deliveries and works' use.

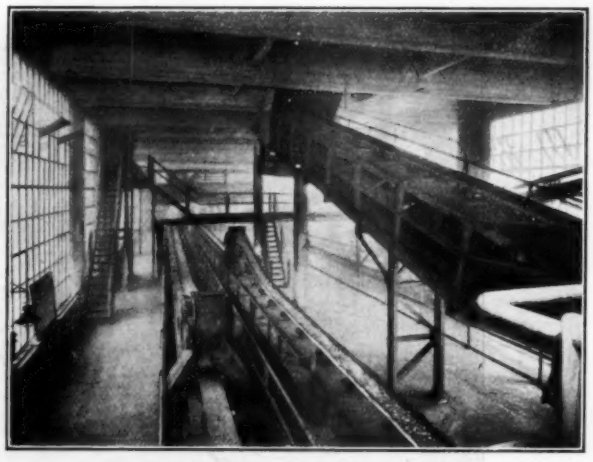


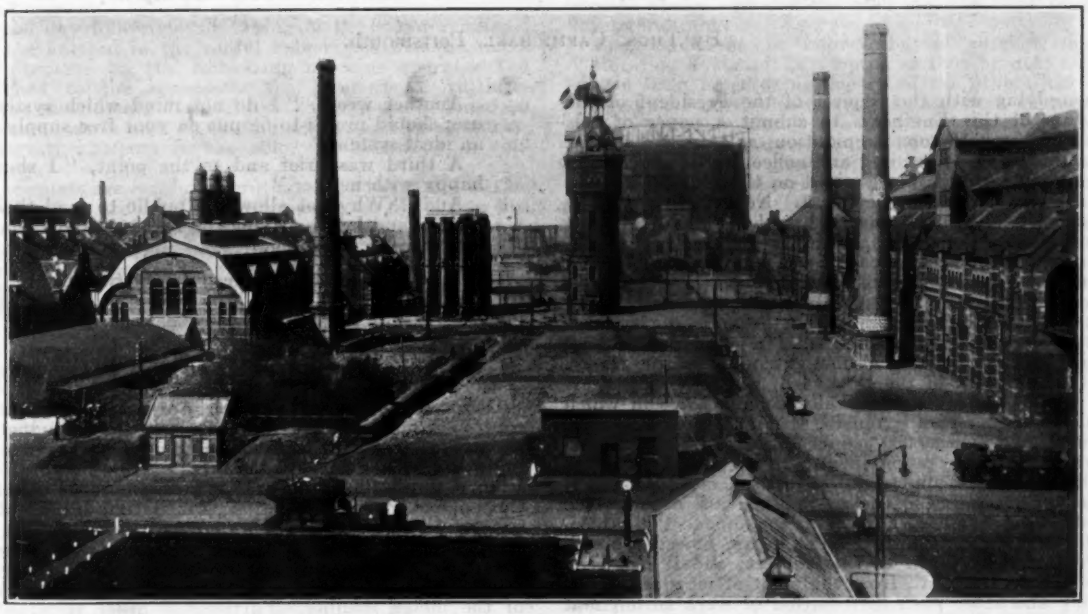
Fig. 5.—Conveyor Hall Coke Plant, Southall.

Brentford.—The plant is designed with an ultimate capacity of 500 tons of coke per day. Crushers are provided, and the original water washers are being removed and a dry cleaning plant substituted in their place.

The plant is arranged to deliver sized coke to:

(1) Barges for river transport.
(2) Berths for bagging for local trade.
(3) Lorries for London and district deliveries.
(4) The boiler house.
(5) The carbonizing plant producers.
(6) The carburetted water gas plant.
(7) To stock.

Gas Production in Amsterdam



AMSTERDAM MUNICIPAL GAS UNDERTAKING.
General View of the Western Works.

The General Director of the Municipal Gas Undertaking of Amsterdam in his recently issued annual report for 1932 states that as a result of the general industrial depression the gas production for the twelve months amounted to 4062 million c.ft. compared with 4155 millions in 1931—a falling-off of 2·24%. The quantity of coal purchased during the year reached a total of 184,714 tons, compared with 189,707 tons in 1931, the purchases comprising 107,022 tons of British coal, 75,685 tons German, and 2007 tons Dutch coal. The output of coal gas amounted to 2972 million c.ft., against 2988 millions in the preceding year. There was also a slight decline in the output of water gas.

The Amsterdam Undertaking comprises two gas-works—the Western and the Southern—and two distributing stations which, together, possess nine gasholders with a total storage capacity of 11,289,000 c.ft. During 1932 the length of the distribution mains was increased by about 7 miles, bringing the total up to approximately 516 miles. The two works have the advantage of both rail and water facilities for the unloading of the necessary coal supplies and for the loading of barges or wagons with coke. The production of gas is about evenly divided between the two establishments. The output of the Western Works is supplied direct to the distributing mains, whereas that of the Southern establishment supplies part of its output direct to the mains and part to the two distributing stations, one of which is in the east of Amsterdam and the other in the northern portion of the city.

That the Undertaking gives every possible encouragement to the use of gas for domestic purposes may be gauged from the fact that, in addition to maintaining showrooms for the display of cooking and heating stoves, &c., no fewer than 140,533 slot meters are in use in Amsterdam and district, this figure representing about 68% of the total of 204,900 meters in use.

It is interesting to add that Mr. Ir. M. van der Horst, the General Director of the Amsterdam Undertaking, to whom we are indebted for the photograph from which our illustration has been reproduced, has lately been elected President for 1934 of the Association of Gas Manufacturers in Holland.

NOTES ON PLANT AND PROCESSES

The "New Herald" Gas Combination.

The advantages of the "New Herald" combination gas cooking range, boiler, and fire are becoming increasingly appreciated in the Industry, and the catalogue dealing with this appliance, recently published by the manufacturers, Messrs. R. Russell & Sons, Ltd., of Peel Foundry, Derby, ably sets forth its selling points.

At a very moderate first cost, having regard to the functions it is designed to perform, the "New Herald" takes up little or no more room than the average gas cooking range, while it can in addition provide for the hot water requirements of the household, and efficiently warm the kitchen. The boiler can be connected up to an existing tank and piping system, and it is claimed that with gas at 3s. per 1000 c.ft., twenty gallons of hot water or two hot baths at 100° F. are easily obtainable at a cost of 1½d. The economy of space and expense in dispensing with the independent boiler is, of course, obvious. Access to the boiler burner is through a door just below the gas fire hood. The boiler is fitted with two burners and an automatic regulator, which cuts the gas consumption down from the maximum of 45 c.ft. per hour (on the larger burner) to 10 c.ft. per hour, giving twenty gallons of water at 140° F. per hour. The smaller burner has a normal maximum consumption of 15 c.ft. of gas per hour, cutting down to 4 c.ft. on the regulator. In this case the capacity is 7 gallons per hour, and the burner may be left lighted throughout the day, ensuring an instant supply of hot water at any time. This smaller burner should be used when rapid heating up is not the first essential.

Turning to the hotplate, this is wider and not so deep as the conventional gas cooker. There are three boiling burners and a reversible griller.

The gas fire is of standard 7-radiant design, and is valuable for warming up the kitchen, or airing clothes, &c.

The "New Herald" is supplied in black and white mottled vitreous enamel finish, with white enamelled oven door panel and crown plate, giving attractive appearance combined with durability.

Meter Reading and Collecting of Accounts*

Describing Methods Employed by the Portsmouth Gas Company

By Thos. Carmichael, Portsmouth.

In complying with the request of the President of the Institution of Gas Engineers to submit a paper of this nature, I do so with some trepidation, as I am aware that the systems of meter reading and collecting of accounts in your country are highly organized on the most up-to-date lines, and are exceedingly efficient. Nevertheless, it may be of interest to you to hear of the methods adopted by the Portsmouth Gas Company in order to obtain the best results by the most economical means. In passing, it may be mentioned that this Company, in point of size, ranks among the first twenty in the United Kingdom.

Portsmouth (which embraces Southsea) is a city of a quarter of a million inhabitants, is an important naval base and military centre, and is also an extending seaside resort. With the exception of the Dockyard, which is the largest in the world, there are practically no industries in which gas can be used on an extensive scale. There are 72,000 consumers, of which 30,000 are on the ordinary credit, and the remainder on the prepayment system.

In the majority of undertakings in the United Kingdom, the quarterly practice of meter reading still obtains, the accounts being rendered as near as possible to the respective Quarter Days. During recent years, however, much thought has been given to this subject, and it has been realized by several that, from the point of view of general efficiency and more even distribution of work throughout the year, the adoption of some other method would be more advantageous.

In the case of the Portsmouth Gas Company it was considered particularly desirable that a change should be made in order to overcome the following difficulties:

(1) The disorganization of the Sales or Fittings Departments caused by the borrowing of men for several days at the end of each quarter for the purpose of reading meters.
(2) The congestion of work occasioned in the Rental Office as a result of the clerks having to record the meter readings, and to issue demand notes to consumers within a period of three weeks.
(3) The large amount of work thrown upon the cashiers consequent upon consumers paying their accounts over a period of a few weeks.
(4) The overcrowded condition of the showrooms throughout the period of three weeks referred to in No. 3.

Continuous Meter Reading or Monthly Billing?

After carefully considering the relative merits of continuous meter reading (*i.e.*, the reading of a proportion of the meters daily over a period of three months by a permanent staff of meter readers) and of monthly meter reading, it was decided to adopt the former system, the latter not being favoured owing to the extra expense involved. This is apparent when it is explained that, in Portsmouth, the average consumption for ordinary credit consumers amounts to 48,000 c.ft. per annum, which means that the amount of cash to be collected per consumer per month would have amounted only to approximately 10s.

A decision having been arrived at, the question then arose, How would the consumers re-act to a change of system which had been in operation for nearly 100 years? It was considered advisable that they should answer this question, and, to give them an opportunity of so doing, an explanatory letter was posted to each of the 30,000 ordinary credit consumers concerned, together with a "business reply card." The return of this card was necessary only if the consumer objected to the proposed adoption of the continuous meter reading system, yet, in spite of this, nearly 6000 (or 20%) of the cards were received, of which number only 500 (or 1·66% of the total number sent out) expressed objection to the proposed alteration. Many, on the other hand, complimented the Company on the consideration extended to them, and some of the replies were in a decidedly humorous vein. To quote just a few:

> "I wish you wouldn't read my meter at all; but, if you must, do the dirty work at any time convenient to yourselves," wrote one.
>
> Another wrote, "I do not mind which system you use; should prefer to be put on your free supply list as an ideal system."
>
> A third was brief and to the point, "I should be happy with neither."
>
> And, "Why not allow the public to read their own meters and let you know the results? This would result in a great saving."

On the day following the despatch of the circular letter, by arrangement with the Editor, a leading article explaining the reasons for the suggested change appeared in the local Evening Paper.

How the Change-Over was Effected in the Office.

Having thus taken reasonable precautions to ensure the continued goodwill of our consumers, the introduction of the new system was proceeded with as follows. A series of notes, under the heading of "Instructions to Staff" was handed to all employees whose work would be affected by the change. These notes explained that all simple hire charges for appliances would be apportioned, so that in the two three-monthly periods of the change, consumers, who in most cases received accounts for a part-quarter only, would be charged with amounts due up to the actual date of the meter reading. Further, in order to avoid complaints by consumers of having been charged with instalments before they were really due, all hire-purchase charges for appliances, &c., would be dealt with in the same manner.

In rendering accounts for gas during the early period of the change, the advertisement space on Demand Notes was used for the purpose of reminding consumers that, after the second three-monthly period, accounts would be rendered to them quarterly, but not necessarily near to the usual Quarter Days, as had been the practice in the past. In order to obviate the necessity for rendering accounts covering only a few days' consumption—as would have been the case had the system started at the beginning of a quarter—the change-over period was commenced in the middle of a quarter and extended over several months. The new system is now in full operation and is giving every satisfaction, not only to the Company, but also to its consumers.

Cash Receipts from Various Sources.

It is now proposed to explain the methods adopted in dealing with cash receipts from consumers and customers under the following headings:

(1) Ordinary credit consumers.
(2) Prepayment consumers.
(3) Consumers purchasing appliances and fittings installed on hire-purchase terms.
(4) Consumers purchasing appliances and fittings installed on ordinary credit terms.
(5) Consumers, and customers not necessarily consumers of gas, purchasing residual products.

1. *Ordinary Credit Consumers.*

A prospective consumer is asked to sign Application Forms for a supply of gas, and for any appliances that may be required on simple hire terms, or on the limited hire system. Security is required under certain conditions, either in the form of a deposit or a guarantee, but, subject to the accounts being satisfactorily settled during a period of three years, security is then dispensed with and the deposit refunded with simple interest at the rate of 4% per annum. When the work of fixing the meter and other appliances is completed, meter reading sheets are prepared and fitted into loose-leaf binders. While meter reading is in progress, these binders are in the possession of the readers, so that if called upon to do so, they are in a position to discuss with the consumer any noticeable variations in the quantity of gas consumed.

Five permanent meter readers are sufficient to deal with the 30,000 ordinary credit consumers, which include about 400 consumers to whom monthly accounts are rendered by reason of large consumptions. Each meter reader deals, on an average, with 110 meters per day, at a cost of 1·16d. per meter. One of the advantages derived from continu-

* Paper read before the Annual Convention of the American Gas Association.

ous meter reading is that more time can be given to the investigation of consumers' complaints, as, by a careful comparison of previous consumptions, defective meters are more readily detected, thereby avoiding possible dissatisfaction to the consumer and, incidentally, effecting a saving to the Company.

On the day following the taking of the meter readings, these are entered in the rental ledger, the demand notes being prepared by the addressing machine operator and dispatched to the consumers the same day. All hire-purchase instalments due and hire charges are included on the demand notes and, by issuing accounts in this manner, no congestion occurs in the office—cash coming in continuously.

All accounts are carefully scrutinized by the rental clerks, and reminders are sent out, after a period of four to five weeks, to those consumers whose accounts are still unpaid. If this notice does not have the desired effect, then it is followed by what is known as a "24 Hours Notice," threatening to discontinue the supply at the expiration of that time. The system, however, has worked so satisfactorily that only on extremely rare occasions has it been found necessary to take drastic action. It will be abundantly clear that the results have been satisfactory when it is explained that, during the past few years, with an annual collection of approximately £250,000, arrears at the end of any one quarter have never exceeded £1300 (quivalent to about 2% on the quarter's charge) and the actual bad debts have amounted only to £300, or 0·13%.

You will realize from what has been said that the Portsmouth Gas Company does not employ collectors for the purpose of collecting the accounts of ordinary credit consumers. It may surprise you to know, that while many of the consumers pay by cheque, a very large number prefer to call personally to effect a settlement of their accounts. This practice is encouraged because the lay-out of the offices and showrooms is such that, in order to reach the cashier's counter, consumers must first pass through the showrooms. Here the latest appliances are tastefully displayed so that many additional sales are made. Consumers may, if they desire, pay their accounts at the district banks, or at the branch offices of the Company instead of at the Head Offices, and the whole of the cash taken from these sources is balanced daily.

The total cost of ordinary collection, including supervision, meter reading, rental staff, cashiers, stationery, and postage amounts to 0·8d. per 1000 c.ft., or 0·18d. per therm sold.

2. *Prepayment Consumers.*

These consumers are supplied through meters fitted with attachments which enable them to insert either copper or silver coins (the latter limited to sixpenny or shilling pieces). For many years we have had mechanized methods for dealing with the whole of the records, the machines being designed specially for this work. There is a record card for each consumer which constitutes the ledger account. All the cards are retained in the office, and, from them, carbon duplicate receipt books are prepared daily for each collector by the office staff, who write up a sufficient number of receipts to allow for meters which have been unread and uncollected for various reasons, or where the district affords facilities for a larger number of meters being dealt with. Collections are made twice a Quarter.

The collector completes the receipts at the consumer's house by entering the index reading of the meter, calculating the cash value of the consumption after having made allowance for gas prepaid but unconsumed, and recording in the first column the amount of cash received. The whole of the money found in the cash box is cleared, the receipt showing the amount due to or by the consumer. Any surplus is handed back to the consumer, and small sums due to the Company are carried forward until the next collection.

The second column of the receipt book is in use on alternate days for meters not examined on the first visit. If the meter is not cleared upon the collector's second visit, a special collector calls at a later date.

On completion of the day's work, the collector totals up his receipt book and pays the amount into the cash department. He prepares a separate docket for any complaints received and reports to his superintendent all meters which are defective, such as those which do not register, pass gas without coin, or are of faulty mechanism. The collector, who works single-handed, packs the coppers into 5s. bags, and exchanges them at business premises during the course of collection, thereby maintaining an equal distribution of coppers throughout the city, and, at the same time, lightening his load.

The receipt books are examined for discrepancies by the clerical staff, and details are then transferred to the cards by means of Burroughs' adding machines, and are dealt with at a maximum speed of 270 cards per hour. A separate daily record of each collector is kept by check clerks and summarized monthly. The total of this summary is balanced with the collector's cash book. This book is kept by the chief clerk of the Department, whose duties are to receive cash each evening from the collectors, balance their receipt books, and pay the cash into the bank on the following morning.

Each collector is known by a number, and the "Rotating System" is adopted so that he does not again collect from a meter until each of the others has in turn cleared that particular meter. In addition, examiners are employed whose duties are to attend to complaints and minor repairs to meters, and, while carrying out this work, they also clear the meters of cash, furnish a receipt in the same manner as the collectors, and thus afford an intermediate check upon the latter.

The cost of prepayment collection, including all charges —*i.e.*, supervision, clerical staff, wages of collectors and examiners, and stationery—works out at less than 1½d. per 1000 c.ft., or 0·33d. per therm sold, while the cost of collection *only* is 1d. per 1000 c.ft., or 0·22d. per therm sold. The average consumption per consumer exceeds 30,000 c.ft. per annum.

3. *Consumers purchasing Appliances and Fittings installed on Hire Purchase Terms.*

The progress of the system of hire purchase in the United Kingdom during the past fifteen years has been amazing. Prior to 1914, deferred payment systems were not greatly favoured, but, since then, the standard of living has so improved that the appetite of the general public has been whetted with the desire for things which previously were regarded by them as unattainable. Until two years ago, the Portsmouth Gas Company supplied goods on hire purchase and took an instalment upon the signing of the contract; but since then, "Limited Hire" contracts have been instituted, the only difference being that no instalment is taken when the contract is signed. This has given a distinct impetus to the sale of appliances generally, so much so that more than 10,000 contracts have been entered into since this innovation.

It is naturally the desire of the Company to extend the use of gas to *all* classes of consumers and, consequently, a "Limited Hire" system has been inaugurated for prepayment consumers, under which payments are made at regular periods—*i.e.*, weekly, monthly, or quarterly, whichever is thought most suitable to the consumer. The method of payment having been decided upon, the contract is recorded in ledgers in the ordinary way, and a Consumer's Record of Collection Card, with a complete history of the transaction is passed to the Sales Department and is in due course handed by the salesman to the consumer. The salesmen are also responsible for the collection of cash instalments in their particular districts. This has the distinct advantage of preventing the salesmen from "overselling," and, upon completion of a contract, he is in a position to judge the financial standing of the consumer and so decide whether or not it is advisable to press for further sales.

Dependent upon the period arranged for payment (weekly, monthly, or quarterly), salesmen call upon consumers for the purpose of collecting instalments due, and all payments are recorded upon the Consumer's Record of Collection Card, and also upon a cash sheet which is handed in each day to the cashier at the Head Office, such payments being then transferred from the cash sheet into the ledgers in the ordinary way. There are three separate ledgers for recording the transactions—namely, for weekly, monthly, and quarterly accounts respectively—and the system has been found to work most satisfactorily. The chief advantages derived are:

(1) That the goodwill already existing between the consumer and the Company has been improved.
(2) That, through the more frequent personal contact of the salesmen, consumers are able to use more efficiently the appliances which have been installed.
(3) That, by accepting payments as low as 6d. per week, the Company has experienced no difficulty in obtaining these instalments, neither has the consumer been caused any inconvenience in finding such small amounts.

4. *Consumers purchasing Appliances and Fittings installed on Ordinary Credit Terms.*

For many years the fittings section, dealing with charges for appliances sold from stock, and for fitting work executed at consumers' premises, was operated on a ledger card system. All charges were priced out in the office, and the value debited to the consumer on the ledger card. Accounts were rendered, and any unpaid at the end of the Quarter were transferred to the rental ledger to be included in and collected with the accounts for gas consumed.

A Charge Sheet System (in duplicate) is now in operation

and the job is handed out to the fitter through the medium of the district inspector. Upon completion of the work, the charge sheet is returned to the inspector, who forwards it to the office fittings section, where it is priced out and the debit to the consumer created. All charge sheets are under the control of the accountant's department and, as each bears a number, any missing are soon detected and explanations asked for. Consequent upon increased sales of appliances and fitting work generally, it was decided to keep the fittings section entirely separate, and a self-balancing loose-leaf system was introduced. The sheets are specially designed, and an important feature of the system is that the profit on any job may be ascertained almost immediately. It has been found that accounts have been paid by consumers much more promptly than was the experience under the old system, whereby a large number delayed payment until the account was transferred to the rental ledger at the end of the Quarter, and, as a result, five to six months' credit was being taken in many instances.

5. *Consumers, and Customers not necessarily Gas Consumers, purchasing Residual Products.*

The marketing of coke and other residual products is of ever-increasing importance to gas undertakings. During the past few years, when the question of installing new manufacturing plant has been under consideration, much care has been exercised in ensuring that the resulting products, after carbonization, will be marketable. The installation of central heating systems and the more general use of coke have brought about the need for careful grading of this commodity, and most undertakings of any size have installed coke grading plants to meet the requirements of their customers.

The accounting department is also responsible for the rendering and collecting of accounts for all residuals. Loose-leaf ledgers on the self-balancing principle are in use, and the details of sales and charges to customers are obtained from the day books which are received from the various works. Except by special arrangement, all accounts are required to be paid on the 15th of the month following delivery of the residuals supplied. A " follow-up " system in connection with unpaid accounts is in operation, and the results are so satisfactory that, for many years past, the amounts written off as irrecoverable have not exceeded £30 on a total Residuals collection varying between £80,000 and £90,000 per annum.

Conclusion.

Owing to the somewhat limited time allowed for this paper, most of the sections have been treated in a general way, but it is hoped that at least an outline has been obtained of the methods adopted by the Portsmouth Gas Company so far as meter reading and receipts from consumers and customers are concerned.

It may have occurred to some of the members present that the systems are not so up-to-date as those employed in your country, but, after all, the real test is to be found in the answers to the following:

(1) Are the running costs low?
(2) Are the consumers satisfied?
(3) Is prompt payment effected, at minimum cost to the Company and with minimum trouble to the consumer?
(4) Is the proportion of " bad debts " reasonable?
(5) Is fraud amply guarded against?

If the answers to these questions are satisfactory, and it is suggested that such is the case, there is no object in installing other systems until it has been conclusively proved that some material advantage is likely to be derived therefrom.

From Section 3 of the 1932 Edition of " Field's Analysis " of the Accounts of Gas Undertakings in English Provincial Towns, it will be seen that the average cost of management charges, which include directors, auditors, salaries, collectors, stationery, and general charges, works out at 0·428d. per therm sold, or 2·07d. per 1000 c.ft. The comparative costs of the Portsmouth Gas Company, which are included in the above figures, are 0·292d. and 1·31d. respectively.

This re-modelling of the meter reading and invoicing system is merely a phase (an important one) in the general policy of the Company which must necessarily receive, in these times of depression and keen competition, the closest attention. In general, any new method or proposed alteration is subjected to close scrutiny on the following lines:

(1) Are the running costs low?
(2) Is the price of gas reasonable and competitive?
(3) What is the capital expenditure of the undertaking?
(4) What is the return upon the capital employed?

The price of gas in Portsmouth is, and has been for some years past, 7d. per therm, subject to special discount rates, while the capital expenditure works out at 6s. 10d. per 1000 c.ft., or 1s. 6·2d. per therm, which is one of the lowest figures obtaining in the United Kingdom. Quoting " Field's Analysis " once again, the average capital of the undertakings included in Section 3, is 9s. per 1000 c.ft., or 2s. per therm sold.

By the adoption of a prudent policy and modern methods, the Company has been able to combat satisfactorily the keen electrical competition of to-day. The success achieved in this direction is clearly demonstrated by the fact that, during 1932, in spite of the economic conditions prevailing throughout the country, the sale of appliances was greatly in excess of any previous year, and the sale of gas a record in the history of the Company.

It is pleasing to be able to state that, although the sales last year constituted a record, the sales for the half-year ended June 30, 1933, show even better results.

In this paper, the writer has dealt only with systems in force in the Portsmouth Gas Company, and hopes that the information given will be of some interest and value to the members of the American Gas Association.

Australian Gas Light Company.

Satisfactory Progress Reported.

Mr. A. Consett Stephen, Chairman of Directors, presided at the Ninety-fourth Annual General Meeting held in King's Hall, Hunter Street, Sydney, on Aug. 17, 1933.

The Chairman, in moving the adoption of the report, said: Although the effects of the depression are still with us, there are definite signs of a renewal of confidence among the public, and a re-awakening of enterprise.

On the occasion of the last two Annual Meetings, I have had to report to you decreases in the sales of gas, but I am glad to inform you to-day that there has been an increase in sales during the past year, and, in addition, the number of the Company's consumers has increased by 2348 to a figure of 250,794. Incidentally, this is the first occasion on which the number of consumers has passed the quarter of a million mark.

The net profit, including the amount brought forward from the previous year, amounts to £309,525. An interim dividend at the rate of 3%, and amounting to £123,300, having been paid in February last, the sum now available for distribution is £186,225. A final dividend at the rate of 3% for the June half-year is now recommended, which will absorb £123,300, and will leave a balance to be carried forward of £62,925.

During the year, the sales of gas for industrial purposes amounted to 559,257,800 c.ft., being an increase of 23·5% over that of last year. At the present time the quantity of industrial gas sold represents 9% of the total quantity sold for all purposes. It might be of interest to shareholders to know that last year one industrial consumer used no less than 73,627,000 c.ft. of gas, which quantity is equivalent to that sold to 3052 average domestic consumers. We have, during the year, completed the installation of a large steel tube welding furnace, consuming gas up to 12,000 c.ft. per hour. In another instance a biscuit manufacturing company which is modernizing its plant, has a large gas-fired oven on order from Britain for installation in new premises. This oven will use 2000 c.ft. of gas per hour, its purchase being decided upon after a very exhaustive investigation into the merits of competitive methods of heating.

Inquiries are constantly being made and propositions developed for the application of gas to new processes, an interesting instance in this connection being the recent completion of a plant by one of Sydney's leading radio equipment makers for the manufacture of radio valves. Gas is used in practically all the processes on this plant, and the recent extensions resulted in a consumption equivalent to one-third of a million c.ft. per annum.

It is felt that the field with regard to the use of gas for manufacturing purposes is an enormous one.

The value of gas for hot water systems is being increasingly recognized by architects and builders, and many important installations were made during the year, most of them being conversions from other systems of heating. Special efforts were made to promote a greater use of gas fires for room warming, and I am pleased to say that the sales this season exceeded those of last season by 71%.

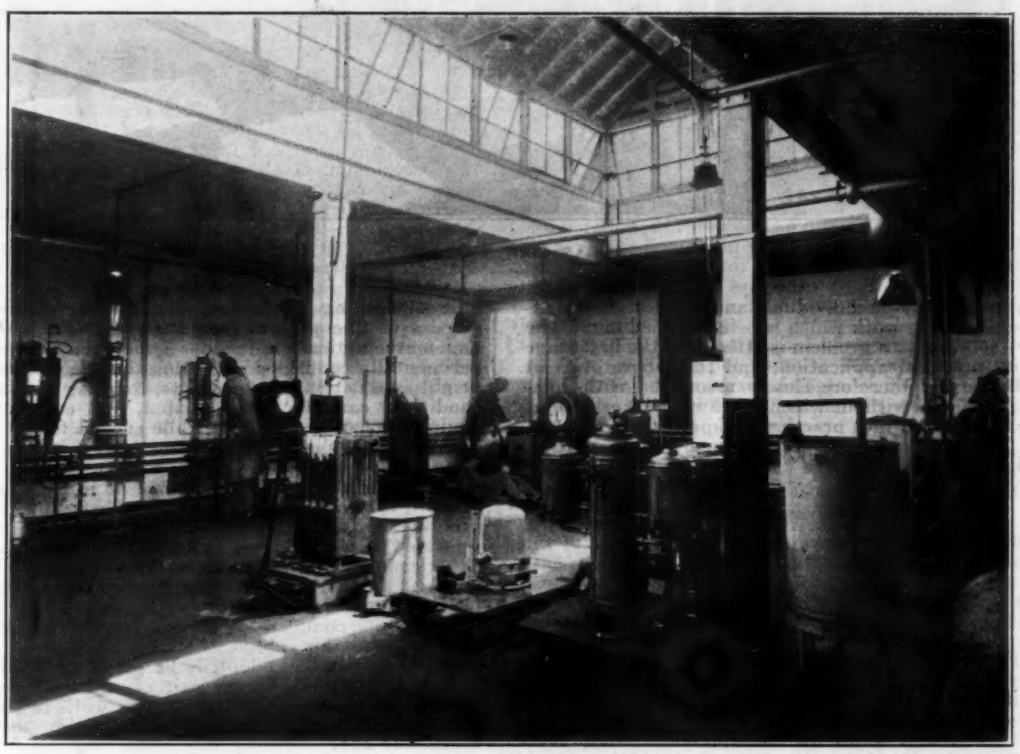
In connection with the sale of bye-products during the year, the position is satisfactory. The net return on sales has increased by £20,436 over that of last year.

Watson House: An English Research Centre*

By C. A. Masterman.

The organization of the British Gas Industry superficially differs in so many ways from the system in America as to create especial difficulties in undertaking the honour of addressing you. In the field of research as affecting gas utilization we are passing through a stage of rapid expansion and development, and it is as yet impossible to anticipate what our final system may be. We admire and in many ways envy you your American Gas Association; and our own arrangements may seem to you, by contrast, disorganized and inadequate. However, your members who have from time to time visited England have given me the impression that they found much to interest them, and this encourages me to hope that a brief description of one of our research centres may not altogether be out of place.

In Great Britain research, development, and testing are carried out in a growing number of laboratories, both of the gas undertakings and of appliance manufacturers throughout the country. Although this arrangement may sometimes lead to the appearance of conflicting views with-



PART OF THE HOT WATER LABORATORY AT WATSON HOUSE.

in the Industry on technical matters, these views become reconciled through the operation of national technical committees on which the undertakings and manufacturers are represented. Major decisions of policy are thus reached in the light of a more considerable background of technical advice than might be the case if one single official laboratory were chiefly responsible.

At the present time there is visible a growing tendency towards direct co-operation between the various independent laboratories as a result of which overlapping and unnecessary work are diminished. This may ultimately lead to some official system of test or certification of appliances, but no such system is yet in operation.

In my own view, any rigid separation in the laboratory between domestic and industrial applications of gas is impossible. The problems requiring solution are fundamentally the same throughout the fields of distribution and utilization. The industrial application of gas does, however, in practice involve the specialist, and, recently, there has been set up in my country a Joint Co-Ordinating Committee to deal specifically with industrial utilization. Its work is supplemented by a Technical Committee meeting at regular intervals and having a membership consisting of technical area representatives. Each area so represented consists of a research centre under the control of a large gas undertaking which has become responsible for giving advice and assistance to the smaller undertakings in its neighbourhood—some dozen such centres being in course of development at the present time.

A free interchange of technical information between the centres is anticipated, together with a consistent policy of co-operation with the makers of large industrial gas appliances, without whose assistance and support the gas undertakings would find progress severely handicapped.

The institution of this scheme of research and development centres is of such recent date that any general description of their method of operation would be premature. As representative of a possible direction in which things may develop I propose outlining the organization and aims of Watson House, which is *inter alia* the utilization research centre of the Gas Light and Coke Company—itself the largest gas undertaking in the country serving the greater part of London north of the River Thames.

Our annual make of gas amounts to about 50,000 million c.ft. for a population of about 5 million, occupying an area of over 500 square miles. This area is predominately residential, so that the gas sold for industrial purposes amounts to only about 8% of the whole, but even so exceeds in quantity the total gas sales of a town like Bristol with a population of nearly half-a-million. It is, in fact, the largest industrial gas load of any single undertaking in the country, and represents practically every industry capable of using gas—some of them being of a surprising kind.

Watson House.

The Gas Light and Coke Company maintains three research organizations, of which Watson House is the one dealing with the problems of distribution and efficient gas utilization. It is in no sense a standardized type of organization, nor does it deal exclusively with industrial uses, which are here stressed only in view of the character of this meeting.

Touch is maintained with a number of technical societies and research associations in addition to public bodies, manufacturers, and the like; and during the course of every

* Paper read before the Annual Convention of the American Gas Association.

GAS FIRE TESTING.

year a large number of individuals and parties visit Watson House to see the work which is being carried out. The laboratory solution to a problem is often only the first stage towards its practical application, and the laboratories at Watson House are therefore closely associated with complementary sections without which much of the work might fail to be interpreted into practice. Time is far from adequate to give any complete description of our activities, but a fairly brief reference to the various aspects of our work may be of interest.

The Laboratories.

The main laboratories are organized on the basis of six groups dealing respectively with water heating, room heating, cooking, lighting, chemical, and mechanical problems. Each group has allotted to it the research problems most nearly appropriate to its defined function; and the abstracting of about 60 technical journals, British and foreign, is organized on the same basis.

A general drawing office, photographic studio, and dark room, and the necessary clerical services are available for the laboratories and other sections in the building.

Standard methods of test of gas appliances, &c., have been evolved and about 200 new manufactured types are submitted to test annually. Primarily, the object of these tests is to determine whether or not the appliances can be recommended to the public, but in the majority of cases improvements are suggested to the makers and are usually embodied, even though in many cases the types are not actually accepted on to the Company's approved list.

No fee is charged, and the results of such tests are not necessarily disclosed in detail to the manufacturer concerned. The result of this work has undoubtedly been of benefit in raising the standard of safety and efficiency of gas consuming appliances in general.

No distinction is drawn in the laboratory between work on gas appliances and fundamental research. The results of the latter are thus automatically linked up with the more prosaic day-to-day problems of utilization. Not only are makers' designs modified or even entirely revised, but designs of new appliances are sometimes originated, either to fulfil some special purpose or to create a non-proprietary type which can be bought at competitive prices by open tender. Appliances other than isolated samples or special types are not manufactured by the Company, which depends upon outside manufacturers and contractors in this connection. Where control over production is especially desirable the Watson House designs are patented, and some dozens of such patents have been taken out—the royalties, if any, being of nominal amount.

Extensive research has been carried out on the products of combustion and on the factors in appliance design capable of leading to carbon monoxide production. The physics of flue performance has been analyzed in detail and mathematical expressions have been derived and experimentally confirmed governing the effect of area, shape, height, restrictions, wind effects, &c. As a result difficult conditions can now be combated, and economies in flue equipment can be effected, while special flue fittings have been designed and installation methods have been modified on to a logical basis.

Corrosion, whether in appliances or in the mains underground, can in time seriously prejudice safety, and underground corrosion especially has been the subject of a considerable amount of work. For a variety of reasons stray electric currents are often found adjacent to our mains and services, and our problem in preventing corrosion often becomes similar to the problem of the electrical engineer in providing complete insulation for the confining of his current within his cable.

We have recently adopted the policy of drying our gas before distribution, as a result of which we have felt it possible to carry out all indoor pipe work in steel instead of in wrought iron which was invariably used until a short time ago.

Methods of proving meters are being reviewed while the introduction of new types of meters having higher speeds of revolution raises new points regarding certain factors in design. At the same time the increasing use of certain water heaters, refrigerators, and the like causes greater emphasis to be laid upon accuracy of registration at the low gas rates at which these appliances operate for prolonged periods of time.

Attempts are being made to correlate the results of academic research on heat transfer with the design of gas consuming appliances. Much work requires to be done, but it has become possible in many cases to anticipate the effects of variations in design with some precision. The thermal efficiency of wash-boilers, for instance, is being raised by some 40% by quite simple means. Gas fire design has been very completely reviewed. By careful attention to detail with the object of raising the temperature of the incandescent material, the radiant efficiency has been increased by some 25%, and considerable changes have been effected in the appearance. As affecting thermal efficiency, accelerated heat transfer may often be less important than the avoidance of heat wastage, and the characteristics and methods of application of various types of thermal insulating materials have been examined. It is now standard practice, for instance, for lagging to be applied throughout a domestic hot water supply installation, in the absence of which the gas consumption might be more than double the estimated amount. It is in this connection that laboratory figures may sometimes be misleading

as quoting a bench efficiency which has no relation to the true efficiency which is obtained from the customers' installations. This may be especially difficult to evaluate in connection with certain types of central heating plant where the only true criterion of efficiency is the comfort condition of the occupant of the room in relation to the amount of gas used in the plant, capital cost, &c.

Similarly, cooking or refrigerating operations require the consideration of factors not usually dealt with in a laboratory, and quite recently an extensive series of tests on characteristic menus has been carried out to compare true cooking efficiencies with gas and other sources of heat.

Gas lighting is, I believe, in America largely a thing of the past, but this is by no means the case with us. Street lighting is a very competitive field, but we have retained a large part of the street lighting of London, including some of the main thoroughfares, such as Whitehall. Such installations are now often specified very closely, involving the calculation of horizontal illumination on the roadway and the like, together with subsequent tests of the installation in operation in order to maintain the quoted efficiencies.

Testing Section.

An extremely important route for the interpretation of research lies in the specification and test of stores bought by the Company. In carrying out this work the Testing Section also co-operates with the other departments in the standardization of store items used throughout the Company, and with the British Standards Institution for standardization on a national scale.

Stores are bought by the Company to specifications prepared in this Section which is responsible for maintaining quality, thus enabling the Buying Department to effect great economies in the adoption of a directly competitive purchasing policy.

The protection of the community against the installation of defective material represents a direct financial gain to the Company, in addition to its being the Company's obvious social responsibility.

In addition to the routine test groups, a Control Room or Special Laboratory forms the headquarters of the Section at Watson House, in which the more detailed tests are carried out and in which development work for the improvement of quality or design is continually in progress.

A period of five minutes a day wasted by every fitter owing to defective materials, ineffective tools, or obsolete methods will in the course of a year cost the Company over £10,000.

Training Section.

Since the Company carries out nearly all the gas-fitting on its area, the introduction of new appliances and new methods involves the distribution of technical information to the whole of the sales and fitting staff of the Company, amounting to a total personnel of about 8000. This work is carried out from the Training Section in various ways.

Boys straight from school are indentured to the Company and go through a complete six years' course, of which the first two years are spent at Watson House. In addition, a number of lads are taken on by the Company as assistant fitters, and they, too, pass through a modified course of training with us. Young candidates for staff appointments pass into the Company as staff pupils on leaving school or as staff trainees if possessing some outside experience—an important part of their training being at Watson House. All these recruits to the Company are required to take evening classes at a technical school which is under the control of the London County Council but with which the Section is closely associated.

A greater problem lies not in this initial training period which at any one time covers a small proportion of the total personnel, but in the keeping up to date of the many thousands of salesmen and fitters who are actually carrying out the Company's business. A proportion of these take evening classes at the technical schools, but a system of periodical visits to Watson House for training classes is also in operation. These classes normally last a week and deal specifically with the type of work for which those attending the classes may be responsible, such as cooker maintenance, geyser installation, hot water work, &c. The need for all-round knowledge by the fitter apart from these special subjects is, however, taken into account and is in fact recognized officially under the London Gasfitters' Classification Scheme which links up the fitters' grade and wage with his capability and craftsmanship as determined by examination and test. This direct instruction is supplemented by encouraging the foremen and others attending the classes to pass on their up-to-date information to their fellow workers on the district on their return.

A printed and illustrated Bulletin is prepared monthly at Watson House for issue to the sales and fitting staff, this Bulletin being especially intended to be of assistance regarding new methods or new appliances which are being introduced.

For the sales staff, numbering about 1200, a series of three or four annual visits to Watson House is arranged, and during the course of these visits those attending are given an opportunity of seeing demonstrations of all the

PART OF THE INDUSTRIAL SHOWROOMS AT WATSON HOUSE.

matters which have been referred to in the Bulletin in the interim. These visits also give an opportunity for discussions on topical matters.

There are also held during the course of the year a number of lectures and demonstrations for outside societies or organizations, such as architects, builders, plumbers, school teachers, who may be connected directly or indirectly with the use of gas.

An Information Bureau is maintained to deal with district problems with the least possible delay.

Industrial Section.

If the Training Section may be described roughly as the link between the laboratories and the district in domestic matters, the Industrial Section represents the laboratory contact with industrial problems.

I am happy to say that I have Mr. W. Dieterichs, the Manager of the Industrial Workshops and Showrooms with me here to-day. His Section moved to Watson House only about eighteen months ago, and already the closer contact thus established with the laboratories has been of considerable mutual benefit.

All the workshops at Watson House have now been merged into the Industrial Section, the Manager of which is thus automatically brought into touch with laboratory development work of all kinds before the quantity production stage is reached.

In these same workshops are made various special gas appliances which the exceptionally varied character of our trades and industries demands. Standard furnaces and the like are used wherever possible, but even these often require adaptation.

A close co-operation exists between the Section and the appliance manufacturers, who are also invited to undertake the quantity production of specialized or patented designs when an appreciable demand has been discovered or created.

The Section possesses its own drawing office and laboratory, all appliances being tested in the latter before despatch.

A large showroom is maintained in which is installed a characteristic selection of modern industrial appliances, many of them on live gas for purposes of demonstration.

It is essential to maintain close contact with the industrial process in which gas is to find its application, and personnel from the Section are continually out on the district dealing with the installation of new plant or with the replacement or modification of obsolete appliances or systems. Where the improvements effected have led to a greatly reduced gas consumption a more than compensating return is looked for in building up a widened scope for gas in that same factory.

This technical liaison with the factories on the Company's area supplements the wider and more complete supervision of the industrial field by specialist salesmen operating from our Head Office. These special representatives maintain touch with the Industrial Section at Watson House and are responsible not only for visiting all factories but for establishing touch with new industrial ventures before the factories themselves are erected. The special representative who meets some opportunity for using gas in, perhaps, an unusual connection passes the inquiry to the Industrial Section at Watson House where the possibilities are immediately reviewed. If no standard design of appliance is suitable a special design is prepared, together with a complete quotation including estimated gas consumption and guaranteed output figures. If special information is required the help of the laboratories may be involved. The quotation being accepted, the work is put in hand in the shops, which are fully equipped and staffed with specialist workmen. Sub-contracts may be placed for some components when this is possible in view of the Company's policy of co-operating to the maximum extent with appliance manufacturers and contractors. Finally, after testing, the installation of the plant is supervised and arrangements are made for subsequent maintenance.

Advances in Metal Surgery

By C. W. Brett, M.I.W.E. (Managing Director of Barimar, Ltd., Scientific Welding Engineers).

How many readers of the "Gas Journal" are aware that to-day there is no metal which cannot be welded? Only quite recently welding, at least in repair work, has lost its experimental character and has become a certain means for uniting every known alloy.

The industrial depression of the past few years has given a great impetus to repairing defective machinery instead of replacing it. That is why welding has advanced so rapidly, for it provides the only means for restoring to broken parts their full efficiency and strength, while it is alone as a means for eliminating the consequences of wear and tear.

Welding, of course, has been known for a great many years but until recently its practical applications were decidedly limited. Even in the most expert hands considerable risks attended all work on castings, while reinforcing and building-up operations were not only hazardous but were frequently impossible owing to there being so many metallurgical problems which still remained unsolved.

Nowadays, however, it can be safely stated that a valuable casting need never be regarded as beyond repair, while all the ferrous and non-ferrous alloys have yielded to the experiments which have been conducted on them.

Repairing Cast-Iron and Malleable Parts.

Perhaps the most valuable of all the discoveries which have been made is a process for repairing cast-iron and malleable parts in a definitely fusive manner but at temperatures no higher than those which are commonly employed in brazing. This is known as the low-temperature process, and has been commercially feasible for only about three months. It involves an entirely new technique in manipulation, a novel form of blowpipe, and the use of welding materials of a special type. With its aid even large castings can be welded without pre-heating and with no risk of distortional troubles. This new process was introduced to deal with the complicated cracks and fractures which are so often suffered by the cylinder block castings of light internal combustion engines. These castings are often of widely differing thickness and their repair by ordinary welding methods entails the risk of faces losing their truth, bearings getting out of line, and cracks developing either during the operation or subsequent to it.

With the new low-temperature process employing oxy-acetylene gas these hazards are avoided without "muffling" the parts, and hundreds of such repairs are being effected every week. The process is adaptable to the requirements of many industries and allows all light castings to be repaired at rarely more than a sixth of the cost of a replacement part. The work takes two days as a rule and is as reliable for replacing broken-off lugs and remedying similar results of accidents as it is for sealing minor frost cracks. In the hands of an expert operator the cooling-off operation after the welding has been completed need not be lengthy, and no machining is necessary except to remove any surplus metal which there may be in the region of the weld.

Safety at High Temperatures.

In the case of heavier sections high temperatures have still to be used for obtaining effective welds, but they have been rendered safe by scientific means for obviating distortion. It is not an uncommon thing for temperatures in excess of 2000° C. to be needed when a big casting gets smashed, but careful pre-heating and controlled cooling eliminate the risks which were for so long in evidence. In the factory of a modern specialist welding repairer are coal gas muffle furnaces containing as many as a thousand jets which are under control in carefully planned groups. Before a welding operation is begun on a complicated casting of a kind calling for high temperatures the casting is mounted on a special trolley which is run into the muffle and heated under controlled conditions. When the general and local temperatures are correct the trolley is run out on rails and the work is begun immediately. During the course of it the trolley may have to be returned to the muffle a dozen times or more, and when it is completed there still remains the need for a protracted cooling period during which the muffle temperatures need to be very accurately controlled.

Advanced welding repair work of this kind is adaptable to the requirements of all gas engineers and is now so well

understood that it is carried out under guarantee. Pump castings, steam engine parts, booster components, condenser fittings, conveyor components, and so forth can be speedily repaired at a cost which is always much less than that of buying new castings; and if the defect to be corrected is due to over-loading or a weakness in design, any necessary reinforcing can be carried out to ensure that there will be no recurrence of the trouble.

In the case of alloys possessing particular characteristics, such as exceptional hardness, tensile strength, or resistance to corrosion, the well-equipped welding engineer can ensure that the requirements are met in all new metal that is added. Further, the nature of the parent metal adjoining the weld remains unchanged both on test and in service.

The repair of engine crankshafts, which is now an everyday occurrence in a modern welding engineer's factory, illustrates the accuracy of the limits which can be observed. Whether a crankshaft is fractured across a web or through a journal it can be repaired with no loss of truth in any plane. Machining is necessary only for "cleaning-up" after the welding operation, and the shaft can be replaced in its original bearings with the assurance of correct bedding and alignment.

The processes which have been evolved for work of this kind can be employed for building up worn shafts, renewing worn splines, truing damaged key-ways, and re-building chipped gear teeth. When gear wheels have suffered serious damage similar processes can be used for welding new teeth in place, and practical tests have shown that such teeth wear uniformly with the remainder of the teeth on the wheel and give entirely satisfactory service. The teeth not only of plain spur wheels but of helical and double-helical bevels can be replaced in this way.

There is an increasing tendency for the rotors or vanes of rotary and semi-rotary pumps to be formed integral with the shaft, and, in consequence, when the latter becomes worn and scored at the gland it pays handsomely to have it built up by welding rather than to replace the entire component. The building-up operation restores the original diameter of the shaft, and the initial polish, tensile strength, and hardness are regained. Processes used for work of this kind are valuable in the re-conditioning of the components of conveyors.

Mobile Welding Units.

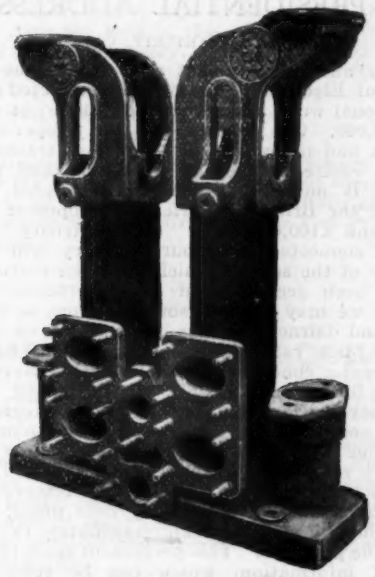
Perhaps to gas engineers the most valuable of all recent developments in welding repair work is the growing availability of mobile welding units which can visit a site on which repairs to machinery are needed and carry them out on the spot. Both oxy-acetylene and electric arc welding are employed, and special equipment has been introduced to enable very speedy repairs to be effected. Usually these "flying squad" jobs, as they are termed, have to be done against the clock to reduce a shut-down to the shortest possible period, and only men of outstanding skill and experience are employed. Their work is always arduous and often attended by not a little danger.

Generally speaking it is an advantage to have welded repairs done on the site only when there are overwhelming transportation difficulties—for example, in the case of a large boiler.

In the repair of boilers the usual routine is for an examination first to be made by an expert welding repairer, who ascertains the shape and dimensions of parts which will have to be cut away and replaced. Replacements are then made in advance before the welding squad commences operations. This shortens the shut-down, which can often be planned to be of not more than twenty-four hours' duration. When old metal is cut out of boilers, the "patches" are butted and not lapped, so that there are no lodgment areas for scale and fur. Similarly, in furnace repairs all defective metal is cut right out and replaced with new sections that have no laps and resist corrosion and burning.

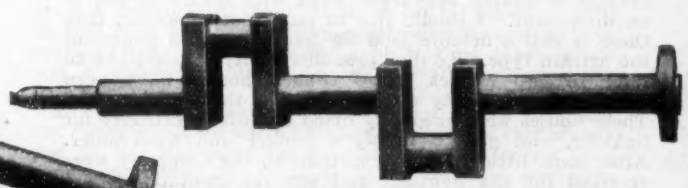
The only warning note that needs to be sounded in connection with welded repairs is that they are not nearly so simple as they appear. In consequence they should be entrusted only to concerns which have a very wide experience and which are equipped with the most up-to-date laboratory and workshop facilities. It may be taken as a safe rule that unless a guarantee is given before work is begun there is something lacking in a repairer's organization.

Heavy duty pumps very seriously broken and apparently ruined.



Successfully repaired by welding, these pumps have been giving satisfactory service ever since. The repair took only 3 days, and saved the owners a substantial sum.

Broken gas engine crankshaft. A valuable part rendered useless in a second.



The same crankshaft repaired with strength equal to new by scientific welding. This repair saved the owner over 60% of the cost of a new shaft.

(REPAIRS EXECUTED IN THE BARIMAR WORKS.)

Wales and Monmouthshire Junior Gas Association

The opening meeting of the 1933-34 Session was held at the Royal Hotel, Cardiff, on Oct. 21, when Mr. Herbert S. Bartlett was installed as President.

Mr. H. D. Madden, M.Inst.C.E., Engineer and Manager of the Cardiff Gas Light and Coke Company, extended to the Association a cordial welcome to Cardiff.

Mr. I. G. Jenkins, President of the Wales and Monmouthshire Association of Gas Engineers and Managers, was present.

Tributes were paid to the retiring President, Mr. C. S. Thane, for the excellent work he had done during his year of office.

PRESIDENTIAL ADDRESS

of H. S. Bartlett, Cardiff.

Recently an announcement appeared in the Press that the Central Electricity Board had completed its task of constructional work under the grid system, at a total cost of £26,000,000. One hundred and thirty super stations had been built and more than 4000 miles of transmission line had been erected. The job of selling and distributing electricity is now left to the various local authorities; meanwhile the British Electrical Development Association are to spend £100,000 on a "buy electricity" campaign. Everyone connected with our Industry will realize the immensity of the scheme which has been carried through. This has been accomplished by Government assistance; and while we may have personal opinions as to the justification and fairness of this project, let us not be disheartened, but rather allow it to act as an incentive toward greater concentrated effort, with a view to keeping gas in the forefront.

About seven years ago the Cardiff Gas Light and Coke Company commenced a canvass of all consumers. At the present time we have a complete census of our consumers, and also a record of all appliances in use. To keep this census up to date, it is, of course, necessary to canvass houses where changes of tenancy take place, and this is accomplished by making a call immediately the new tenant occupies the premises. This permanent record is a valuable source of information, which can be referred to and utilized for the extension of the Company's business, as it shows where concentration can be centred in any one direction in the furtherance of sales.

In these days of progress and advancement, a certain amount of apathy appears to exist with regard to gas as an illuminant. I should like to point out, however, that there is still a definite field for gas lighting in houses of the artizan type. To illustrate this point, I should like to refer to two estates where council houses have been erected, the majority of which are of the parlour type. These houses were originally fitted out with electricity for lighting, and gas to supply a cooker and wash-boiler. After some little time, applications to the Company were received for gas lighting, and our representatives were asked if fittings could be installed. As this was permissible under our usual prepayment installation, our canvassers got busy, with the result that since 1928 we have been successful in securing consumers for lighting, as the following figures indicate:

Number of Houses Fitted Up.	Fittings.		Total Number of Fittings.
	Pendants.	Brackets.	
1207	739	2468	3207

Some alarm was caused at the time, and efforts were made to impede our progress in this direction. However, the controversy ultimately resulted in our favour, and our consumers were able to enjoy freedom of choice in this matter.

Builders and Architects.

Building in the outside areas of Cardiff is advancing at a fair rate, and it is imperative for our representatives to keep in close touch with architects and builders, particularly the latter. While it is the Company's policy to encourage builders to install points for gas by giving them certain concessions, the impression created at the first and subsequent interviews accounts for a good deal in retaining the goodwill and co-operation of the builders concerned. Much can be done in this direction, and, fortunately, we have been successful in keeping our builders "gas-minded" by periodical calls for the purpose of placing before them the advantages and utilization of gas to its fullest extent. Some little time ago it was decided to allow builders to have an enamelled "up-to-date" cooker in one of their houses for demonstration purposes. This was carried out in a number of cases with satisfactory results, culminating in a sale which otherwise might have been obtained by our competitors.

By adopting a friendly attitude with the builder, it has been possible to obtain from him the names and addresses of prospective owners, and by this means an interview is obtained with a view to ascertaining their requirements before the house is occupied.

It was felt that development on the lines indicated was desirable, and a step further has been reached in this connection. On a certain estate in the suburbs the builder has set apart one house as a specimen, or complete "show house." A lady is to be in attendance continually for the purpose of conducting prospective purchasers over the premises. In this particular case we have obtained the builder's consent to install a cooker, wash-boiler, two gas fires, and a small sink heater. It is anticipated that many people will take the opportunity of viewing this house, and, incidentally, we shall have in the house a showroom displaying our appliances. About 200 houses are to be erected on this site in the near future, and it is expected that we shall be able to add the majority, if not all, of the householders to our list of consumers.

THE PRESIDENT,
Herbert S. Bartlett.

Mr. Bartlett received his early training at the Cardiff Technical College. He spent two years with a firm of Coal Exporters at the Cardiff Docks before joining the Cardiff Gas Light and Coke Company. He now holds the position of Chief District Inspector. Mr. Bartlett acted as Hon. Secretary of the Wales and Monmouthshire Junior Gas Association for four and a half years from 1928 to 1932.

Hot Water Supply.

One avenue which I am convinced provides for increase in our domestic load is the use of gas for water heating purposes. Reasons may be advanced for the comparatively slow rate of development in this direction; but here is a field which presents full scope and opportunity, and which certainly calls for our attention in the future. An enormous gap exists at present between the cooking load and that for the purpose I have mentioned; in fact, the use of gas for water heating can be considered in its infancy, and it is safe to assume that the possibilities in this direction are far beyond our wildest expectations.

Having dealt with a few points appertaining to the policy

and methods employed in the promotion of our business, the question arises as to where lies the channel for the development of gas in its various ramifications. One hears and reads a good deal about " bottled " gas and also the use of gas as applied to motor vehicles. There is no doubt that although the application of gas for the uses mentioned are in an experimental stage at present, progress will be maintained, it is hoped with ultimate success.

In the meantime, however, the domestic load which has carried us through many years of progress demands our attention for some time to come. We have not nearly reached saturation, which it is the desire of every undertaking to attain. Upon examination of our records the consumption per consumer leaves a considerable margin for improvement. It is hardly conceivable that a large proportion of our consumers only expend up to 3d. per day on gas, so that you will readily follow what I am endeavouring to point out. It is just the difference between this expenditure of a copper or two, and, say, sixpence outlay on the part of the consumer, which would be correspondingly reflected in the figures appearing in our balance-sheets.

How is this to be accomplished? The answer lies with each and everyone of us engaged in the Industry, as we can all take on the rôle of salesmen, irrespective of the capacity in which we find ourselves engaged.

Vote of Thanks.

In support of a vote of thanks to Mr. Bartlett for his address, proposed by Mr. C. B. Felton and seconded by Mr. C. H. Collins, Mr. H. D. Madden referred to the excellent work of the Junior Associations all over the country—the high quality of the papers, their value as a training ground for higher positions, and the noteworthy successes of past members. " There is no doubt," he said, " that chief officials do mark the men who are active in junior work." He was proud to have to some extent assisted in the formation of the Wales and Monmouthshire Junior Association, together with Mr. Octavius Thomas, to whom he paid a warm tribute.

Mr. Madden invited the Association to visit their Industrial Gas Centre when next in Cardiff, and said that numerous inquiries were coming in which required concentrated study to enable them to recommend the best available appliances.

Mr. I. G. Jenkins (President of the Wales and Monmouthshire Association of Gas Engineers and Managers) also congratulated Mr. Bartlett.

Mr. R. J. Auckland (Secretary, Cardiff Gas Light and Coke Company) referred to the more difficult experiences through which Juniors had to pass to-day, and to the way they were met with the help of their Associations, to the great benefit of the Gas Industry.

Mr. W. S. Stanford (Newport), Mr. B. J. Bell (Cardiff), and Mr. W. C. Crowley (Newport) also spoke to the motion, which was carried with enthusiasm.

After the business proceedings the members were kindly entertained by the Chairman and Directors of the Cardiff Gas Light and Coke Company, who were cordially thanked on the proposition of Mr. J. F. Rust, Junior Vice-President of the Association.

London and Southern District Junior Gas Association

Presidential Address of Mr. H. C. Sims

The opening meeting of the London and Southern District Junior Gas Association was held at the Westminster Technical Institute on Friday, Oct. 20—Mr. A. Tennant (East Surrey) in the chair.

The Assistant Hon. Secretary (Mr. G. Gardiner, of Wandsworth) read the minutes of the last meeting, which were confirmed.

Mr. Tennant said that he was sure they would agree that the Association was suffering a great loss when he told them that they were to lose two of their most prominent members—Mr. W. T. Kenshole, who had been appointed Engineer and General Manager at Merthyr, and Mr. J. H. Goldsmith, who was taking up the appointment of Engineer and Manager at the Port Elizabeth Station of the South African Lighting Association. He was sure it was the wish of all the members that he should extend to these gentlemen the best wishes for their prosperity in their new spheres. Their names had figured as two of the most prominent members of the Association, and he could speak from personal experience of the work they had carried out for the Association. It had been his pleasure to work with them while Hon. Secretary of the Association, and he recalled many happy memories of the very enjoyable times he had working with them. They would miss them at their meetings. Their valuable help in discussions and their sterling work for the Association would be a memorial to them for all time. He felt that he was losing two of his best friends in the Industry.

Mr. Kenshole said that the time he had been associated with them covered a long period. Their present membership of 428 was a splendid achievement and proved the wonderful value of the Association. He would like to take this opportunity of thanking all those who had contributed in making his association with them so pleasant. It was an association which would remain vividly in his memory, and he felt that the break was going to be very considerable. He would always follow the movements of their Association with interest and pleasure, and he proposed to continue his membership because he felt that it had helped him very much in his work.

Mr. Goldsmith also thanked Mr. Tennant for what he had said and the kind wishes they had accorded to him. He had no intention of severing his connection with the Association although he was going even further away than Mr. Kenshole. He would always read the reports of their activities with the greatest interest, and he assured them that he would go away fully appreciating the many years' value he had received from the Association.

Presentation of Milbourne Medal.

Mr. Tennant then called upon Mr. R. J. Milbourne to present the Milbourne Medal to Mr. P. Richbell, of Croydon, for the best paper read before the Association during the past session—that on the subject of " Notes on Gas Distribution " read on Feb. 17, 1933. He expressed their gratitude to Mr. Milbourne for presenting this Medal, which was a source of great encouragement to their members, and it was good of him to come there to make the presentation personally.

Mr. R. J. Milbourne, in presenting Mr. Richbell with the Medal, said what a pleasure it was to have the opportunity of meeting them all once again. He regarded their Association as a happy body of members with real enthusiasm among them. It was a privilege and pleasure to present Mr. Richbell with this Medal for his paper on what he was sure was a most important subject, and he congratulated Mr. Richbell on the quality of his paper, which was a valuable addition to the literature on gas distribution.

Mr. Richbell expressed appreciation that the President and Council had considered his paper worthy of this honour and to Mr. Milbourne for presenting him with this very handsome Medal, the value of which would be very considerably enhanced in his eyes by the fact that Mr. Milbourne had presented it personally. The presentation of this Medal should cause great competition among the members to present papers.

The New President.

Mr. Tennant said that it was now his pleasure to introduce their new President in Mr. H. C. Sims, Assoc.M.Inst.C.E., of the South Metropolitan Gas Company. The Association were fortunate in having him for their President for the coming year, for Mr. Sims' experience in the Gas Industry should be a valuable asset to them, and he was sure he would fill the chair with dignity and credit. One thing he would ask of them was that they should give Mr. Sims the same support they had given him during the past year.

PRESIDENTIAL ADDRESS

of H. C. Sims, South Metropolitan Gas Company.

[Extract.]

I feel that in these days of keen competition and in view of the present depression, I could not do better than take for the text of my address the words " economy " and " efficiency." The particular interpretation of the text which I wish to emphasize is the effort which we should make to obtain the maximum efficiency from existing plant by attention to detail and the elimination of waste.

We are not all in a position to choose the type of plant which we believe would give the best results and most

economical operation, but we can all do our utmost to obtain the best possible results from the plant at our disposal. It is surprising how the small losses mount up, and the very closest attention should be given to details with a view to minimizing losses and reducing manufacturing costs.

I should like, if I may, to go step by step through the gas manufacturing process and indicate to you some of the points where it is possible to increase efficiency and thereby save money.

Let us take coal—the material on which the whole of our Industry depends. In most works the choice of coal is limited by the type of plant used and by the geographical situation of the works. The latter aspect needs careful consideration, since it is of no advantage to purchase a very high grade of coal if the cost of transport be so high as to counteract the value of the higher gaseous yield.

With the increasing amount of coke sold in the domestic market there has been an additional cause for us to watch very carefully the ash content of the coal we use. A large number of collieries have installed coal-cleaning plants and the ash content of gas coal generally has fallen appreciably during recent years.

Control of Coal Quality.

With regard to the control of the quality of the coal purchased, it may interest you to know a little about the procedure adopted by the South Metropolitan Gas Company. As the ships are being loaded, representative samples of each coal are taken and sent to the laboratory in the North of England. The moisture, ash, and volatile matter are immediately determined and the results telegraphed to London. Further investigation in the Central Laboratory in London of samples of each coal over a period has provided information as to their carbonizing value, so that when the coal is received by the technical staff at the works, they are in a position to utilize it in the most efficient manner. For example, if information is received that a particular consignment of coal is likely to be particularly easy to carbonize, arrangements are made to increase the weight of charge.

THE PRESIDENT,

H. C. Sims.

Mr. Sims has been with the South Metropolitan Gas Company since 1900 in various capacities. He served as a Lieutenant in the Royal Engineers in the war, and had three years' service overseas. He was elected an Associate Member of the Institution of Civil Engineers in 1908.

Apart from such obvious drawbacks as unsatisfactory coke and increase of clinker troubles, a coke of high ash content will lead to an increase in the amount of dust carried to the settings by the producer gas. It is well known that this dust contains iron and alkali compounds which are most deleterious to the retort walls and gradually cause thinning of the structure between the crosswalls. With certain types of refractory material the producer gas dust produces a fusible material which flows from the retorts and wall bricks. This fused material is likely to block up the primary and secondary air ports causing unnecessary expense in keeping them cleared and eventually producing uneven distribution of gas and air in the setting. There are several ways of trapping a proportion of the dust and thereby reducing the damage to the brickwork. Where inside producers are in use a sudden change in the direction of the producer gas offtake will cause the dust to be deposited in collecting chambers which can be periodically cleared. Gas from outside producers can be cleaned by passing it through catch boxes or filters, of which there are many types on the market. These, as you will see, are all points which make for process efficiency and elimination of waste, as a setting using producer gas of lower dust content will have a prolonged life.

Working the Producer.

In working the producer itself too much care cannot be given to such details as the air-tightness of feeding doors or covers. In the case of a sand-sealed cover, the seal must be kept well filled, or if a faced cover is used it must be accurately machined and designed to prevent warping under heat. If this point is neglected combustion takes place on the top of the fuel where it is not required, instead of in the combustion chamber where it should occur. If producer gas is allowed to burn on top of the fuel, combustion is taking place at a point where the brickwork is usually not of a quality to withstand intense heat. That is loss in more ways than one. It means not only loss of fuel, but increased expenditure for covers, frames, and brickwork renewals at the feeding point. Experience has shown that when careful attention has been paid to this important point of tight covers, renewals have decreased to a considerable extent.

Badly fitting clinkering doors mean the pulling-in of unknown quantities of air round these faulty doors, and careful regulation of the primary air is an impossibility. Chipped or broken primary and secondary air slides should be replaced as soon as noticed, and in all cases slides should be set square in their boxes. If they are not, it indicates that they are badly fitting, and, in consequence, air will be drawn in round the slide between it and the box. Care should be taken also that all primary and secondary air ports are kept clear of obstructions such as pieces of coke. The water used for cooling the firebars should be clean and should contain in solution the least possible amount of alkaline chlorides. Under the influence of heat these chlorides volatilize and pass with the producer gas into the setting, where the alkali combines with the refractory material with harmful results. Suspended matter in the water will cause stoppages of nozzles and services, and in many cases it is cheaper to use filtered water rather than incur the expense and trouble of burnt-out grates. It is advisable to take periodical samples of the waste gases from the settings and to analyze them for their CO_2, and CO, or O_2 content; occasional analyses of the producer gas should also be made. Excess of CO in the waste gas indicates insufficiency of secondary air with loss of potential heat, while, on the other hand, excess of O_2 means that unnecessary work is being done in heating the excess quantities of nitrogen and oxygen.

An important source of loss in producer working is the coke drawn from the fires during clinkering. This work should be carefully supervised, and any excessive waste of coke due to careless manipulation of clinkering tools, or owing to inaccessible clinker being formed because of faulty working of the producer, should be immediately checked.

Proceeding on our efficiency tour of the works we find that leaky retort bench fittings are often a great source of loss in the retort house. Retort doors should be kept tight, and care should be taken that in shutting, the catch should slip readily on the crossbar so that the stoker need not lose any time after the charge has been deposited in the retort. I might remind you that immediately the coal is deposited in the retort the evolution of gas is exceedingly high—it may be as much as five times the normal rate. Thus, losses incurred by leaky and ill-fitting doors or delays in closing the doors are proportionately very much greater than would occur if the doors were opened for the same time later in the carbonizing period. It is estimated that such losses may easily be as much as one therm of gas per ton of coal carbonized. Every care should be taken to prevent crossbars sagging and catches dropping and to see that no tar is allowed to remain on the flanges of the mouthpieces. Delay in pushing out charges from horizontal retorts may be caused by deposits of carbon on the mouthpiece.

In maintaining an efficiently worked plant it is well to

lay down definite specifications for the size and type of tools used. This is particularly necessary in the case of augurs. Augurs which are too small mean dirty pipes and ultimately choked pipes. A rejection gauge for testing augurs should not be less than $\frac{1}{4}$ in. smaller in diameter than the gauge for the head when new.

Clean Gauges Spell Efficiency.

In the retort house accurate control cannot be maintained if vacuum governors and vacuum gauges are not kept scrupulously clean. If gas-making is to be an efficient process the governors in the retort house must maintain the vacuum between very fine limits. Not infrequently one may go into a retort house and see gauges so dirty that they can hardly be read and the bells of governors covered with fliers and accumulated grease. It is most important that unnecessary frictional resistance to the movement of the controlling valve of the governor should be avoided. Water overflows must be kept free and a proper level maintained in the tank.

At works using horizontal retorts it is not always realized that an essential item in the efficient carbonizing process is a well and evenly laid charge. The charge should be of uniform thickness throughout the length of the retort. With this end in view careful attention must be given to the performance of the charging machines. The type of machine with which I have experience is the Arrol-Foulis, and with this, as well as with other machines which work in pairs, one on each side of the retort bench, the speed of both machines must be the same. If one machine is faster than the other the charge will be packed at the end of the retort furthest from the fast machine and light at the other end. This state of affairs will always lead to uneven carbonization. The same conditions will arise if the machines do not work simultaneously. The speed of charging should be maintained between definite and narrow limits, and the importance of keeping to these limits should be impressed upon drivers. The actual speed depends on the conditions prevailing in each retort house, but there are one or two general rules which should be remembered. If the machines are too slow loss of gas may occur through doors being open too long, while unduly fast charging leads to packing of the charge in the middle of the retort and consequent incomplete carbonization at that point. If it is found that a well laid charge results from placing 7 falls of coal in the retort in 30 seconds, 32 seconds and 23 seconds should be regarded as the upper and lower limits. Periodical timing of the machines (preferably every day), if regarded as part of the retort house routine, will be found to give beneficial results.

The size of the coal is also an important factor when using the Arrol-Foulis type of machine. As you know, the coal in these machines is passed from the containing hopper through a drum—either revolving or oscillating—to the coal pan and usually seven or more falls constitute a charge. Now this coal drum is not a weighing device, its function being to deliver a constant volume. If the size of the coal passing through the drum varies very much the bulk density varies and the weight of coal charged into the retort is considerably upset. It is important, therefore, that the coal crusher should be maintained in first-class repair, as this piece of apparatus plays a very important part in our plans for efficient and economical carbonization. Generally speaking, 2 in. should be the upper limit of size.

Economy in Steam Raising.

Economy may be effected in steam raising generally by attention to detail. All boiler fittings, joints on steam mains, engine glands, &c., should be periodically scrutinized for leakage. Efficient utilization of the fuel supplied to the boiler house is very important. The choice between breeze and coke must be dependent upon the type of boiler and the quantities of each fuel available. In any case, the size should be as uniform as possible, since variations in grade cause different parts of the fire to vary in intensity and allow air to escape into the flues. CO_2 recorders provide a useful check on the work of the firemen. Combustible matter in clinker should be carefully watched. It has been found possible with hand-fired Lancashire boilers, using breeze, to work to 10% combustible matter in clinker.

We may see elevators running for considerable periods without doing any useful work, since material is only supplied to them intermittently. Now a study of existing conditions will very soon indicate the cause of the trouble and suggest an alteration in methods of working which will eliminate the periods of idle running. In a particular case which I have in mind a group of elevators were dealing with 17·22 tons per hour. After attention had been drawn to this wasteful way of working such arrangements were made to allow the same machines to deal with 34·5 tons per hour.

Pumps also are often run at very much below their best efficiency. Systematic examination and overhaul of these will well repay the labour.

Coke Production.

Now let us look for a moment at the business of coke production. Here again we must devise an economic and efficient process, for no longer will customers take just what may happen to remain after the gas is extracted from the coal. Coke is now regarded as, next to gas, one of the most important of smokeless domestic fuels. It must be graded into sizes to suit the requirements of customers, and the ash and moisture contents must be kept between well-defined limits.

I referred earlier to the necessity of keeping the ash content of the coke as low as possible by buying clean coal. It is also possible to allocate the cleaner portions of the coke to the domestic market by breaking and using the less valuable portion on the works. Moisture is another characteristic which can be controlled. Experience will indicate the type of quenching apparatus most suited to each works, and careful control of the amount of water used will ensure the coke for the market being adequately quenched but yet not in a sodden condition.

Much care and thought are often given to the type of grading and breaking machinery used in order to produce coke of the requisite grade. It is not always remembered, however, that the subsequent handling necessitated by storage and loading causes the formation of breeze, which may if loading is not carefully watched, find its way to the consumer. This difficulty may be quite easily overcome by a suitable arrangement of screens at the loading point.

It is advisable to weigh coke on the type of machine which is fitted with a hopper or other suitable device capable of holding 1 cwt. of coke on the counterpoise, the coke only being passed to the sack when the weighing is completed. This method should eliminate many of the errors of weighing.

Vote of Thanks.

Mr. F. C. Smith (Gas Light and Coke Company), Senior Vice-President, in proposing a hearty vote of thanks to Mr. Sims, said that he had come to this meeting expecting to hear a Presidential Address of outstanding merit, and he had not been disappointed. The Address they had listened to contained lucid and technical data of great interest to all, and the subject was a very apt one. There had been some very loose definitions floating around in regard to economy; but Mr. Sims had given them the correct definition in referring to the elimination of waste. He had shown them that if they were to be efficient they must make a more careful study of detail. The whole Address was really a review of details, for by watching the small points closely economy would be increased. This was equally true on the distribution side. Here they carefully watched the economies which could be produced and trained their men to become more and more efficient and better servants of the public. He felt that the Association were to be congratulated in securing a man of such experience and thoughtful care as Mr. Sims to preside over their deliberations.

Mr. J. W. Webber (Croydon), Junior Vice-President, in seconding the vote of thanks, said that there was for the Junior a part of great importance to play in attending to these economies, and there was much interest to be obtained in doing so in order to get the very last ounce out of the plant they were in charge of.

The President thanked them for the kind way in which they had received his remarks, and agreed that looking for small losses was very good experience and education for the younger men.

Presentation to Mr. Tennant.

The President then asked Mr. Tennant to accept a silver coffee set as a memento of his year of office as President of the Association and as a token of the very warm regard they had for him. They all knew how hard Mr. Tennant had worked for the Association.

Mr. Tennant said how much he appreciated their kindness in making this presentation to him, which he would always prize. His year of office had been a very pleasant one; there was a very fine spirit of comradeship in their Association, and if they went on as they were doing this "happy family" feeling would not only enable this Association to progress, but the Gas Industry as a whole would benefit from their work.

The President offered congratulations on behalf of the Association to Mr. H. J. Risby (South Metropolitan Gas Company) in gaining a Second Class Diploma in Gas Engineering. He was pleased to be in a position to do this, as Mr. Risby was one of his own colleagues, and he was sure they would all join with him in offering their heartiest congratulations on his success.

Mr. Risby acknowledged the congratulations accorded to him.

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

Conditions generally on the Stock Exchange last week were firm, though business was on a slightly reduced scale. The Account finished on Saturday, and the confidence is such that profit-taking had practically no effect on prices. The feature was again the strength of British Funds, for which there was a heavy demand by both American and French buyers, and prices hardened.

The volume of business in the Gas Market was also less; the bulk of the transactions being confined to the stocks of the larger undertakings, particularly Imperial Continental, and there are no outstanding features to report. Prices, however, remained firm and several ordinaries advanced. On the local Exchange, Sheffield rose 4 to 135, and gains of 2 points each were recorded by Croydon maximum stock, Imperial Continental, and Tottenham. The only reactions occurred in European with a drop of 2 to 212, and a fractional fall in Liverpool on the local Exchange. In other cases the prices of transactions were mostly higher than those of the previous week.

Current Sales of Gas Products.

The London Market for Tar Products.

LONDON, *Nov.* 6.

The market for tar products remains practically unchanged.

Pitch is quoted at about 77s. 6d. per ton f.o.b.

Creosote continues firm at 3d. to 3¼d. per gallon.

Refined tar is 4d. to 4¼d. per gallon in bulk at makers' works.

There is a further hardening in the price of pure toluole, which to-day stands at about 3s. 1d.; pure benzole is 1s. 10d.; solvent naphtha, 95/160, is steady at 1s. 8d.; and 90/140 pyridine bases, about 4s. 6d.—all per gallon naked at makers' works.

Tar Products in the Provinces.

Nov. 6.

The average prices of gas-works products during the week were: Gas-works tar, 30s. to 35s. Pitch—East Coast, 72s. 6d. to 75s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 72s. 6d. to 75s.* Toluole, naked, North, 2s. 2d. to 2s. 4d. Coal-tar crude naphtha, in bulk, North, 6¼d. to 6½d. Solvent naphtha, naked, North, 1s. 7½d. to 1s. 8d. Heavy naphtha, North, 10d. to 11d. Creosote, *ex* works, in bulk, North, liquid and salty, 2d. to 2½d.; low gravity, 2d.; Scotland, 2d. to 2½d. Heavy oils, in bulk, North, 4d. to 4½d. Carbolic acid, 60's, 2s. 6d. to 2s. 7d. Naphthalene, £9 to £10. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *Nov.* 4.

With a few exceptions prices are unchanged, but there is more inquiry. Business still remains difficult, however.

Crude gas-works tar.—The actual value is 40s. to 42s. per ton *ex* works.

Pitch.—Little business can be arranged at present, and value is nominal at round 67s. 6d. to 70s. per ton f.o.b. Glasgow for export and 70s. per ton f.o.r. in bulk for home trade.

Refined tar to Ministry of Transport Specification is steady at 3¼d. to 3⅜d. per gallon f.o.r. in buyers' packages, for prompt and forward delivery.

Creosote oil.—Prompt supplies are scarce, and quotations continue steady. B.E.S.A. Specification is 3d. to 3¼d. per gallon; low gravity, 3d. to 3½d. per gallon; and neutral oil, 3¼d. to 3⅜d. per gallon—all in bulk *ex* works.

Cresylic acid.—There has been more buying interest during the week. Pale, 97/99%, is 11½d. to 1s. 0½d. per gallon; dark, 97/99%, 9½d. to 10½d. per gallon; and pale, 99/100%, 1s. 3d. to 1s. 4d. per gallon—all fo.r. in buyers' packages.

Crude naphtha is commanding 4½d. to 5d. per gallon *ex* works in bulk, according to quality and quantity.

Solvent naphtha.—90/160 grade is 1s. 5d. to 1s. 6d. per gallon, and 90/190 heavy naphtha is 1s. per gallon.

Motor benzole.—Value is now 1s. 7d. per gallon *ex* works in sympathy with increase in petrol prices.

Pyridines.—90/160 grade is 3s. 3d. to 3s. 6d. per gallon, and 90/140 grade 3s. 6d. to 3s. 9d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

		s.	d.		s.	d.	
Crude benzole	. . .	0	10	to	0	10½	per gallon at works
Motor ,,	. . .	1	5	,,	1	5½	,, ,, ,,
Pure ,,	. . .	1	8½	,,	1	9	,, ,, ,,

Contracts Advertised To-Day.

Coal.

East Retford Gas Department. [p. 420.]

Meters.

Dewsbury Corporation. [p. 420.]

Pipes.

Dewsbury Corporation. [p. 420.]

Stores.

Dewsbury Corporation. [p. 420.]

New Capital Issues.

Barnet District Gas and Water Company.—The tenders, referred to recently in the "JOURNAL," for the £50,000 of 4½% preference stock offered by this Company were opened on Nov. 6. They amounted to a total of £375,050 at prices ranging from £116 to the minimum of £108 per £100. The lowest accepted tender was at £115 0s. 6d.

Special Order.

Blackpool Corporation.

Application is being made by the Corporation for a Special Order to authorize them to use scheduled lands for gas purposes, to extend the limits of supply, and to make further provision in regard to the supply of gas.

Increased Petrol Prices.

It was announced on Nov. 2 that the price of "National" brands of petrol was to be advanced as from the following day by 1d., raising No. 1 to 1s. 6d. per gallon. The previous change was a cut of 2½d. per gallon on May 17, which followed an improvement of 3d. per gallon on Sept. 14, 1932. In making the announcement, the "National" petrol distributing companies state that their action in raising the price in the United Kingdom is in sympathy with current world prices. The price of National benzole mixture is also increased by 1d.

STOCK AND SHARE LIST.

Official Quotations on the London and Provincial Stock Exchanges.

Issue. £	Share.	When ex-Dividend.	Dividends. Prev. Hf.-Yr. % p.a.	Dividends. Last Hf.-Yr. % p.a.	NAME.	Quotations. Nov. 4. (Provincial Exchanges Nov. 3.)	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
1,551,868	Stk.	Oct. 9	7	7	Alliance & Dublin Ord. ...	120—130	...	...
374,000	"	July 10	4	4	Do. 4 p.c. Deb. ...	85—95	...	94½
557,655	"	Aug. 28	7	7	Barnet Ord. 7 p.c.	165—170	...	...
300,000	1	Oct. 23	1/9½	1/4½	Bombay, Ltd.	25/—27/-*	...	...½
178,280	Stk.	Aug. 14	9½	9½	Bournemouth sliding scale	192—202	...	196—200
550,050	"	"	7	7	Do. 7 p.c. max. ...	163—168	...	164—166
439,160	"	"	6	6	Do. 6 p.c. Pref. ...	135—140	...	137½
50,000	"	June 26	3	3	Do. 3 p.c. Deb. ...	74—79	...	...
162,025	"	"	4	4	Do. 4 p.c. Deb. ...	100—105	...	...
210,000	"	"	5	5	Do. 5 p.c. Deb. ...	120—125	...	...
357,900	"	Aug. 28	7½	7½	Brighton, &c. 6 p.c. Con. ...	160—170	...	168—168
540,000	"	"	6½	6½	Do. 5 p.c. Con. ...	144—149	...	...
195,500	"	"	6	6	Do. 6 p.c. B Pref.	135—140	...	...
1,487,500	"	July 24	5	5	Bristol 5 p.c. max.	112½—113½*a*	...	..
120,420	"	June 26	4	4	Do. 1st 4 p.c. Deb. ...	99—101*a*	...	..
217,870	"	"	4	4	Do. 2nd 4 p.c. Deb. ...	99—100*a*	...	...
328,790	"	"	5	5	Do. 5 p.c. Deb.	121—123*a*	...	...
855,000	"	Sept. 25	8	7	British Ord.	159—164	...	160—162
100,000	"	June 26	7	7	Do. 7 p.c. Pref.	147—152	...	...
350,000	"	"	5½	5½	Do. 5½ p.c. Pref. ...	108—113	...	...
120,000	"	"	4	4	Do. 4 p.c. Red. Deb. ...	94—99	...	...
450,000	"	"	5	5	Do. 5 p.c. Red. Deb. ...	103—113	...	...
160,000	"	June 26	5	5	Cambridge 5 p.c. Deb. ...	115—120	...	...
100,000	10	May 22	6	4	Cape Town, Ltd.	7—8	...	.
100,000	10	Apl. 24	4½	4½	Do. 4½ p.c. Pref. ...	7—8	...	...
150,000	Stk.	June 26	4½	4½	Do. 4½ p.c. Deb. ...	95—100	...	...
626,860	"	July 24	6	6	Cardiff Con. Ord.	117—122	...	...
237,860	"	June 26	5	5	Do. 5 p.c. Red. Deb.	105—110	...	...
157,150	"	Aug. 14	6½	5	Chester 5 p.c. Ord.	105—110½	...	...
98,936	1	Oct. 9	2/-	2/-	Colombo, Ltd. Ord.... ...	1⅞—1⅞	...	...
24,500	1	"	1/4½	1/4½	Do. 7 p.c. Pref. ...	18/6—20/6	...	...
609,304	1	Oct. 9	/11'48	/11'48	Colonial Gas Assn. Ltd. Ord.	17/6—20/-	...	...
296,053	1	"	1/3'30	1/3'30	Do. 8 p.c. Pref.	23/—24/-	...	...
1,796,955	Stk.	July 24	6½	6	Commercial Ord.	120—125	...	...
475,000	"	June 12	3	3	Do. 3 p.c. Deb. ...	75—80	...	...
265,272	"	Mar. 6	—	5	Do. 5 p.c. Deb. ...	120—125	...	122
807,560	"	Aug. 14	7	7	Croydon sliding scale ...	147—152	...	150—151
469,590	"	"	5	5	Do. max. div.	106—110	+2	107—108½
500,000	"	July 10	5	5	Do. 5 p.c. Deb.	120—125	...	...
542,270	"	Mar. 6	7	10	Derby Con.	170—180*e*	...	...
55,000	"	July 10	4	4	Do. 4 p.c. Deb.	98—98*e*	...	...
209,000	"	Aug. 28	5	5	East Hull Ord. 5 p.c. ...	108—113	...	...
179,500	"	Aug. 28	6	6	East Surrey Ord. 5 p.c. ...	127—132	...	129—130
155,019	"	June 26	5	5	Do. 5 p.c. Deb. ...	117—122	...	...
1,002,180	"	Sept. 25	17	15	European, Ltd.	128—138	−2	128—130
19,378,992	"	Aug. 14	5⅝	5⅝	Gas Light & Coke 4 p.c. Ord.	27/6—28/6*f*	...	27/9—28/4½
2,600,000	"	"	3½	3½	Do. 3½ p.c. max.	85—88	...	85½—88
4,477,106	"	"	4	4	Do. 4 p.c. Con. Pref. ...	101—104	...	103—104
6,102,497	"	June 12	3	3	Do. 3 p.c. Con. Deb. ...	81—84	...	82½—84
3,643,770	"	"	5	5	Do. 5 p.c. Red. Deb. ...	115—118	...	116½—117½
3,500,000	"	"	4½	4½	Do. 4½ p.c. Red. Deb. ...	112—116	...	115
270,466	"	Aug. 28	6	6	Harrogate New Cons. ...	120—125	...	...
82,500	"	Aug. 28	7	7	Hastings & St. L. 5 p.c. Conv.	143—148	...	...
258,740	"	"	5½	5½	Do. 5½ p.c. Conv.	111—116	...	...
140,000	1	Oct. 9	110	1/7½	Hongkong & China, Ltd. ...	31/—33/-	...	31/9—32/9
218,200	Stk.	Aug. 14	6	6	Hornsey Con. 3½ p.c. ...	120—125	...	...
5,600,000	"	May 22	10	14	Imperial Continental Cap.	207—217	+2	208—215
223,130	"	Aug. 14	3½	3½	Do. 3½ p.c. Red. Deb.	90—95	...	...
235,242	"	Aug. 14	3½	3½	Lea Bridge 5 p.c. Ord. ...	167—172	...	...
2,145,907	"	Aug. 14	6	6	Liverpool 5 p.c. Ord. ...	130—132½	−⅜	...
245,500	"	June 26	5	5	Do. 5 p.c. Red. Pref. ...	103—113½	...	...
306,083	"	July 17	4	4	Do. 4 p.c. Deb. ...	99½—101½*b*	...	...
165,736	"	Aug. 28	10	8	Maidstone 5 p.c. Cap. ...	180—190	...	...
56,176	"	July 10	3	3	Do. 3 p.c. Deb. ...	69—74	...	...
75,000	5	June 12	110	110	Malta & Mediterranean ...	9—11	...	...
392,000	—	Oct. 2	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	98—108	...	...
231,978	Stk.	Aug. 28	5	5	M. S. Utility "C." Cons. ...	111—116	...	113
818,657	"	"	4	4	Do. 4 p.c. Cons. Pref.	92—97	...	...
112,126	"	June 26	4	4	Do. 4 p.c. Deb. ...	100—105	...	...
148,955	"	"	5	5	Do. 5 p.c. Deb. ...	113—118	...	...
675,000	"	21 May '31	16	16	Montevideo, Ltd.	62—72	...	69
2,061,315	"	Aug. 14	5½	5	Newcastle & Gateshead Con.	25/6—26/3*d*	+./1½	...
682,856	"	"	4	4	Do. 4 p.c. Pref. ...	99—101*d*	...	...
776,706	"	July 10	3½	3½	Do. 3½ p.c. Deb. ...	91—93*d*	...	...
277,285	"	May 8	5	5	Do. 5 p.c. Deb. '43...	107—109*d*	...	...
274,000	"	Aug. 14	5	5	Newport (Mon.) 5 p.c. max.	100—102*a*	...	...
204,940	"	Aug. 28	7½	7½	North Middlesex 6 p.c. Con.	153—158	...	...
398,160	"	Aug. 14	5	5	Northampton 5 p.c. max. ...	101—106	...	...
300,000	"	Apl. 24	9	7	Oriental, Ltd.	125—130	...	...
816,617	"	June 26	8	8	Plym'th & Stonehouse 5 p.c.	167—172	...	170½
504,416	"	Aug. 28	8	8	Portsm'th Con. Stk. 4 p.c. Std.	162—167	...	...
241,446	"	"	5	5	Do. 5 p.c. max. ...	102—107	...	...
114,000	"	Aug. 14	5	5	Preston 5 p.c. Pref.	101—106	...	...
686,312	"	July 24	4	4	Primitiva 4 p.c. Rd. Db. 1911	88—93	...	...
389,813	"	June 26	4	4	Do. 4 p.c. Cons. Deb.	88—93	...	...
150,000	10	Sept. 25	6	6	San Paulo 6 p.c. Pref. ...	6½—7½	...	...
1,736,968	Stk.	Sept. 11	6	6	Sheffield Cons.	134—136*e*	+4	...
95,000	"	July 10	4	4	Do. 4 p.c. Deb.	90—94*e*	...	...
133,201	"	Sept. 11	5	8½	Shrewsbury 5 p.c. Ord. ...	132—137	...	...
90,000	10	June 12	15	14	South African	3—5	...	...
6,709,895	Stk.	Aug. 14	7	5	South Met. Ord.	133—156	...	133½—136
1,135,812	"	"	6	6	Do. 6 p.c. Irred. Pf.	135—140	...	139½
850,000	"	"	20/-*g*	4	Do. 4 p.c. Irred. Pf.	101—104	...	103—103½
1,895,445	"	July 10	3	3	Do. 3 p.c. Deb. ...	80—83	...	81
1 000,000	"	July 24	5	5	Do. 5 p.c. Red. Deb.	112—116	...	...
209,820	"	Aug. 14	8½	8½	South Shields Con.	171—178*d*	...	...
1,543,795	"	Aug. 14	6	6	South Suburban Ord. 5 p.c.	130—135	...	131—133½
300,000	"	"	5	5	Do. 5 p.c. Pref.	112—117	...	115
300,000	"	"	—	4	Do. 4 p.c. Pref.	100—103	...	102—102½
868,837	"	June 26	5	5	Do. 5 p.c. Deb.	119—124	+1	119—123
100,000	"	"	—	—	Do. 4 p.c. Deb.	102—105	...	...
647,740	"	Aug. 28	5	5	Southampt'n Ord. 5 p.c. max.	107—112	...	...
121,275	"	June 26	4	4	Do. 4 p.c. Deb.	99—104	...	...
350,000	"	Aug. 28	5½	5½	Swansea 5½ p.c. Red. Pref.	107—111	...	...
200,000	"	June 26	6½	6½	Do. 6½ p.c. Red. Deb.	103—108	...	...
1,076,490	"	Aug. 14	6½	6½	Tottenham and District Ord.	148—153	+2	151—152
300,000	"	"	5½	5½	Do. 5½ p.c. Pref. ...	124—129	...	...
62,235	"	"	5	5	Do. 5 p.c. Pref. ...	112—117	...	...
199,005	"	June 12	4	4	Do. 4 p.c. Deb. ...	98—103	...	...
85,701	"	Oct. 9	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	90—100	...	96½—97
347,769	"	Aug. 28	7	7	Uxbridge, &c., 5 p.ct. ...	144—149	...	...
88,330	"	"	5	5	Do. 5 p.c. Pref. ...	112—117	...	...
1,322,220	"	July 10	7	7	Wandsworth Consolidated	153—158	+1	156—158
1,096,373	"	"	5	5	Do. 5 p.c. Pref.	117—122	...	121—122
1,317,964	"	June 26	5	5	Do. 5 p.c. Deb.	118—123	...	...
158,400	"	Aug. 28	6A	5	Winchester W. & G. 5p.c. Con.	107—112	...	...

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f*—The quotation is per £1 of stock. *g.*—For quarter. *h.*—Paid £3, including 10s. on account of back dividends. *i*—The interest due 1/7/33 was paid on that date. * Ex. div. † Paid free of income-tax ‡ For year. Hongkong & China, Ltd.—paid on £10 shares.

STOCK FOR SALE BY TENDER.

By Order of the Directors.

BIDEFORD GAS AND COKE COMPANY, LIMITED.

Messrs. A. & W. RICHARDS

are Instructed to OFFER FOR SALE BY TENDER

1200 £10

FIVE PER CENT. CUMULATIVE PREFERENCE SHARES.

Minimum Price of Issue, £11 per Share.

Yielding at that price, £4 10s. 11d. per cent.

Prospectus and Form of Tender (which latter must be sent in by 11 o'clock on Tuesday, 21st November) may be obtained of A. & W. RICHARDS, 37, WALBROOK, E.C. 4.

COMPANY NOTICES.

THE ORIENTAL GAS COMPANY, LIMITED.

NOTICE is Hereby Given that an ORDINARY GENERAL MEETING of this Company will be held at the Company's Office, Finsbury House, Blomfield Street, London, E.C. 2, on Thursday, the 23rd day of November, 1933, at Twelve o'clock noon precisely:

To receive the Directors' Report and the Accounts of the Company for the Year ended the 30th of June, 1933;

To declare a Dividend;

To elect Directors and Auditors in the place of those retiring;

And to submit a resolution regarding remuneration of the Directors.

The TRANSFER BOOKS WILL BE CLOSED from the 6th to the 23rd of November, both days inclusive.

By order of the Board,
S. RAINER,
Secretary.

Finsbury House,
Blomfield Street,
London, E.C. 2,
Nov. 2, 1933.

EDUCATIONAL.

HOW TO BECOME A QUALIFIED GAS ENGINEER

THE T.I.G.B., the premier establishment for engineering training by correspondence, will train you until successful for:

Certificates of the Institution of Gas Engineers, A.M.Inst.C.E., A.M.I.Mech.E., A.M.I.E.E., C. & G., B.Sc. (Eng.) Lond. Univ., etc.

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Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST FURNACE BRICKS, LUMPS, TILES, and every Description of FIRE BRICKS.

Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.

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Sergt. A. E. M. Meters has room for more Therms in his famous squad. Conditions of Service are severe. Therms are required to obey the Sergt. implicitly, and he is most critical. There is, however, compensation in the fact that every Therm is paid in full for every job he does.

Will you allow Sergt. A. E. M. Meters to control your Therms?

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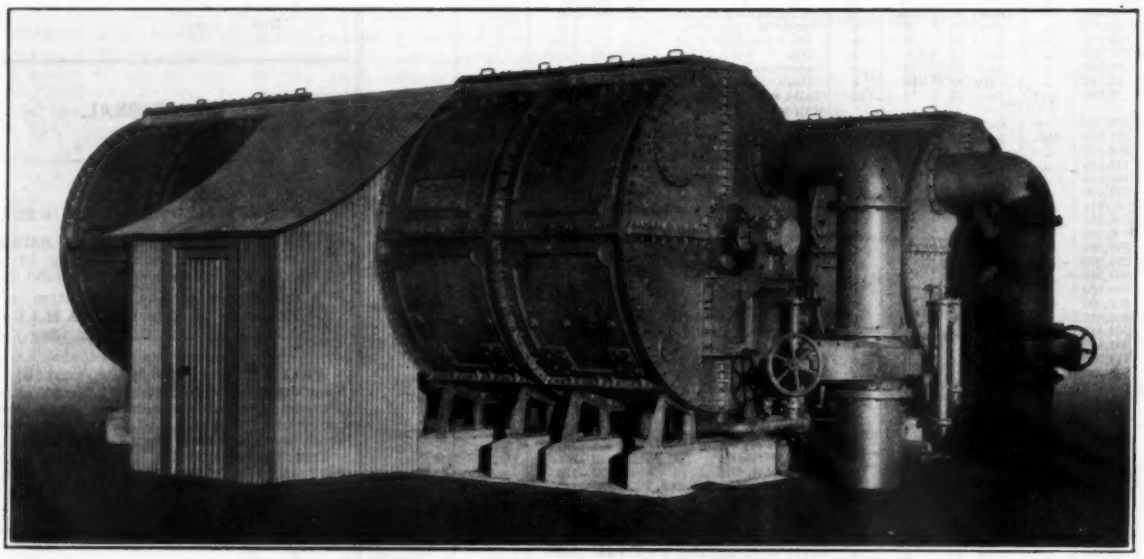

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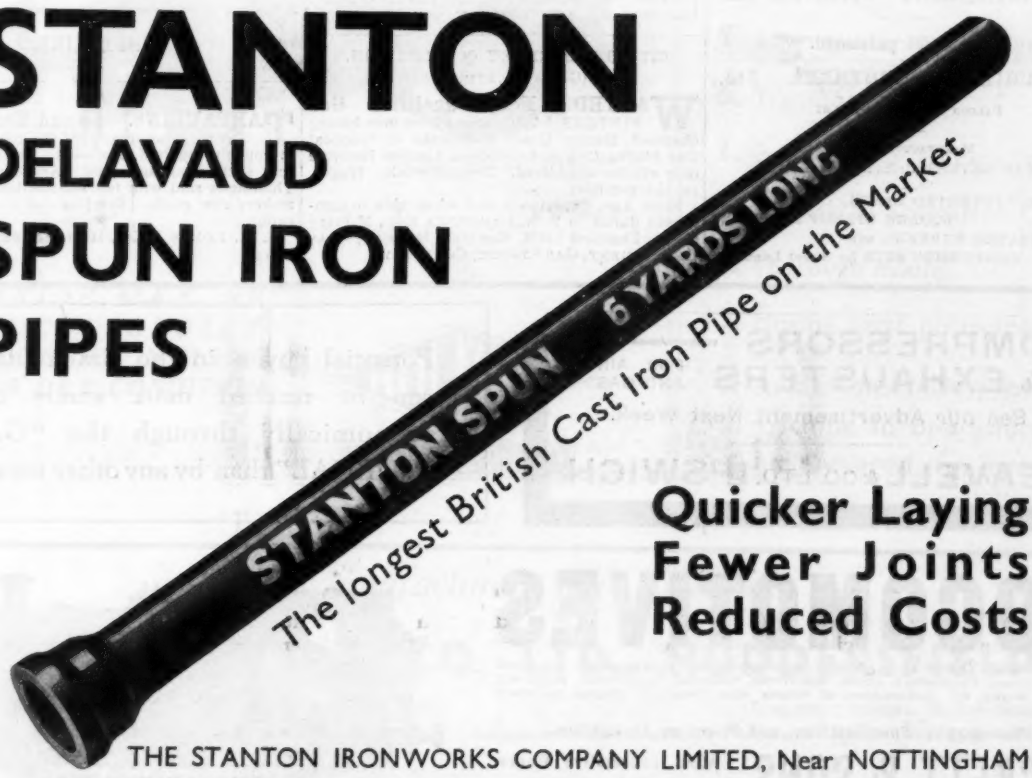

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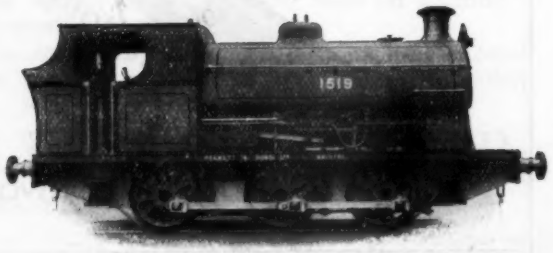

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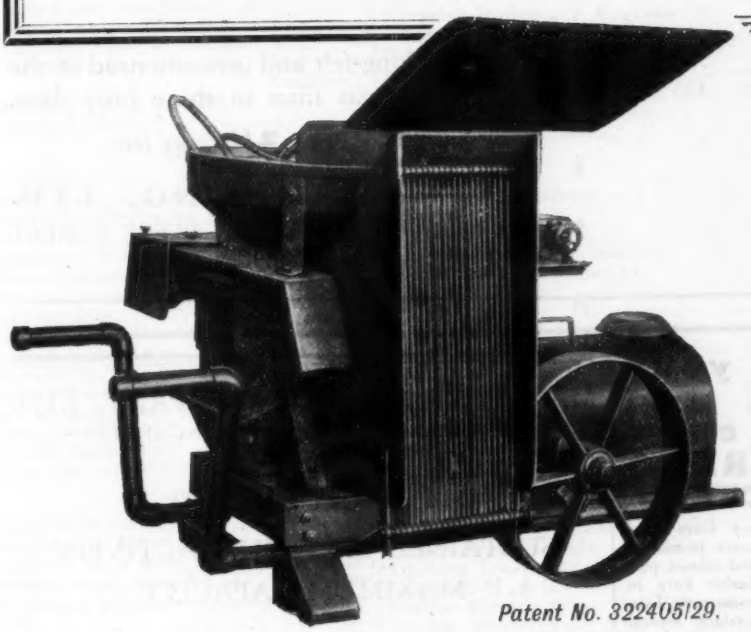

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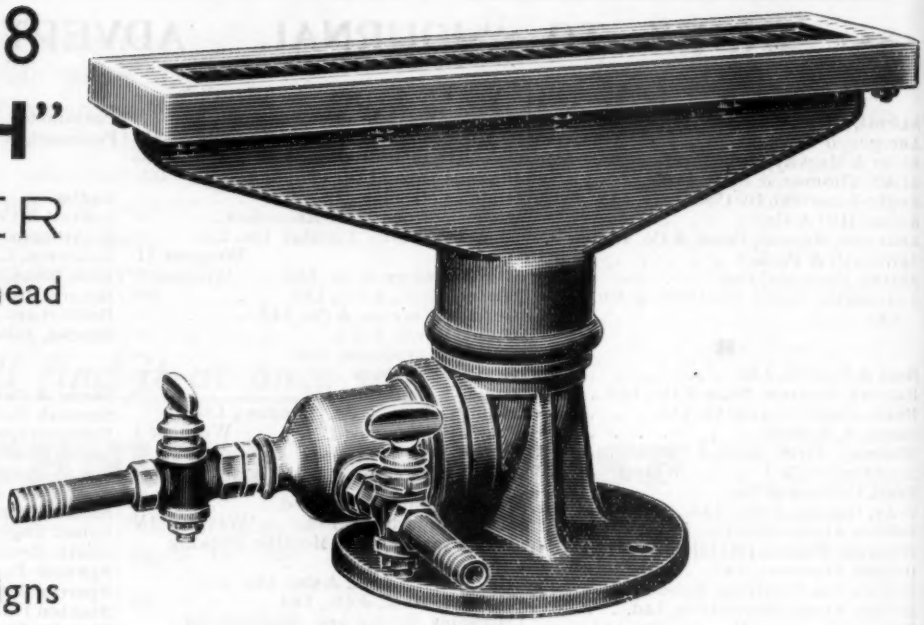

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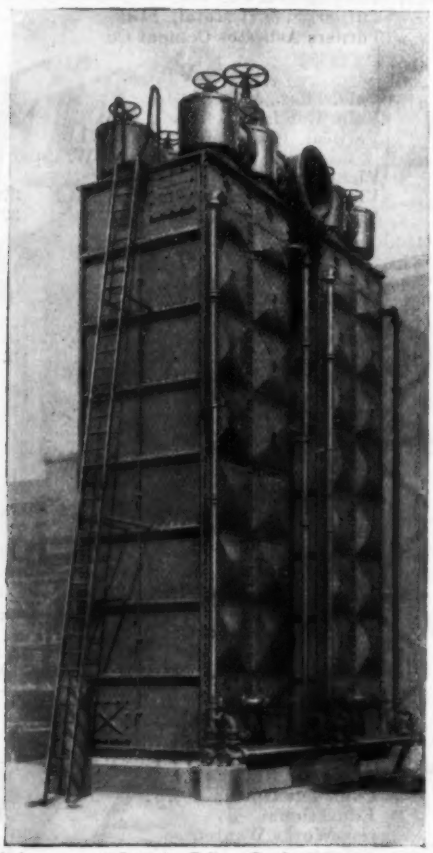

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